DECEMBER 1934
McGRAW-HILL CO. OF CALIF.
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ELECTRICAL WEST

Brighter Far..... An
ELECTRICAL CHRISTMAS

Pre-Christmas Sales Stimulated by NHA Loans

The sales curve of electric ranges—as well as that of other appliances—is moving up sharply to a new "high".

The increased buying which normally is felt at this season has, this year, the added emphasis of purchases made possible by National Housing Act loans.

Southern California Edison Company is supporting the merchants in its territory by focusing public attention on this opportunity to purchase long-wanted electrical conveniences immediately.

Newspapers, billboards and other advertising media are being used intensively to get this important message across to buyers.

Dealers who cooperate enthusiastically can confidently expect a record volume of business all through December.

SOUTHERN CALIFORNIA EDISON COMPANY LTD.

Edison

NRA Graphic Arts Code No. 4-611

ELECTRICAL WEST (with which is consolidated The Journal of Electricity), December, 1934, Vol. 73, No. 6. Published monthly by the McGraw-Hill Company of California, 883 Mission St., San Francisco, Calif. Entered as second class matter at the post office at San Francisco under the Act of March 3, 1879. Additional entry as second class matter at the post office at Los Angeles. Printed in U. S. A. Subscription rate in U. S. and U. S. possessions, $2 per year; Canada, $2.50 including duty; all other countries $3 gold (thirteen shilling). Single copy, 25c. Copyright, 1934. McGraw-Hill Company of California.

ELECTRICAL WEST

With wh'ch are consolidated the "Electrical Journal," the "Journal of Electricity, Power and Gas," and the Journal of Electricity."

ESTABLISHED 1887

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883 Mission Street
San Francisco, California

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▼

• ENGINEERS have asked themselves whether the age of readjustment in which they now find themselves is going to relegate them to the closet shelf or whether there will be for them some opportunity to exercise the talents to which they have given their lives. In opening the two Pacific Coast Electrical Assn. conclaves President Markwart reviewed the problem brilliantly and suggested means and viewpoints which will help engineers find the answer.

• WANTED—ANSWERS—the questions are numerous, perplexing, sometimes involved and difficult. Less courageous people than Americans might be stopped by them. But the people in this industry will search hard for the answers. The problems facing the industry, as outlined in the remarkable problem papers presented at the two P.C.E.A. conclaves, will be solved.

• ELECTRA'S HUSBAND speculates on writing a letter to Santa Claus. BILL JONES uncovers the seven strings which make all human puppets work. RURAL LOAD BUILDING brings to light some practical farmer helps that should add further to the advantages electricity has over competitive power. BRAINSTORMS are coming in from everywhere; how about that one you thought of? Christmas programs dominate all cooperative activities just now, and a good thing too.

• DOUBTERS of code operation were given a fine report of progress to date in northern California at the contractors' one day convention. Wholesalers told how their code operation will also help make business cleaner.

Next Month

• STARTING the New Year right ELECTRICA WEST has a fine list of good features in store for you beginning in its January number. Dealer cooperative groups will find value in a monthly table of the sales of various appliances in the several regions in which dealer reports are gathered each month. Other valuable and useful aids in your everyday business will be found too.

THE *Trend is Toward*

Pyrex

POWER INSULATORS

PYREX IS A TRADE MARK AND INDICATES MANUFACTURE B

CORNING GLASS WORKS • CORNING, N. Y.

A Motor to Match

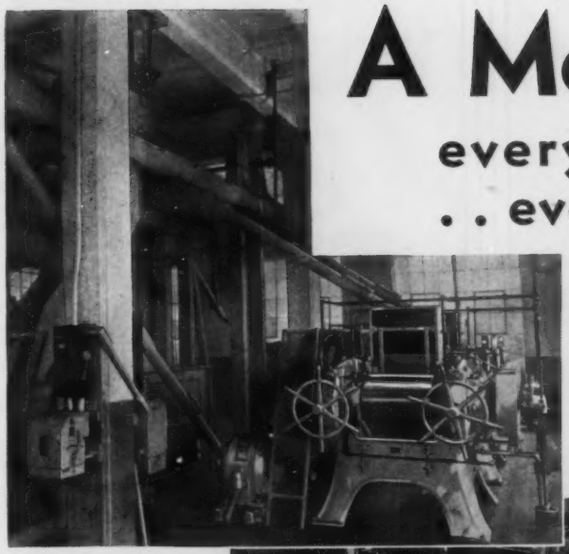
every Food Industry Drive .. every Type of Application

IN few industries are the requirements for motors driving processing machinery as varied as in the many branches of the Food Industries.

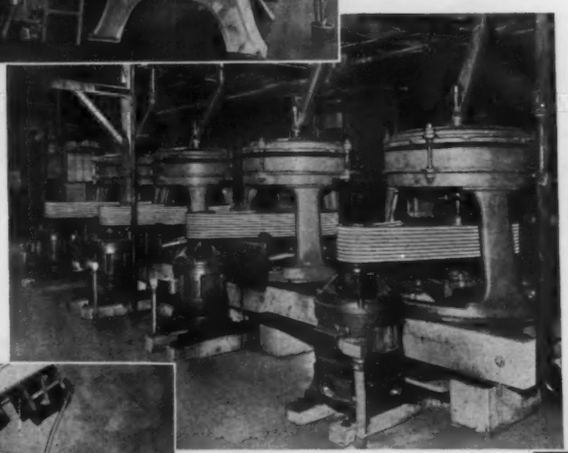
Protection from dust or moisture is necessary in many plants; the "washing down" of the machinery after a period of operation presents an extra hazard for motors, while the varied types of machinery used in the food plants necessitates motors not only of different mechanical but also of special electrical characteristics.

Allis-Chalmers motors are built in types, sizes and with special characteristics to meet these varied requirements.

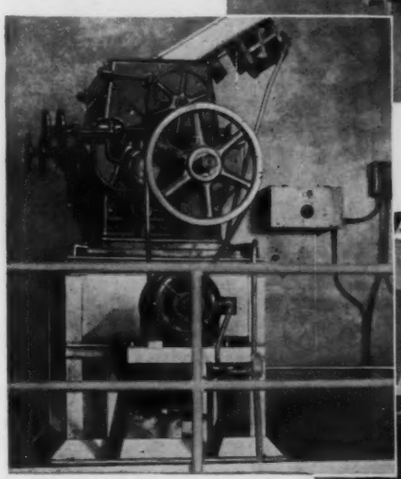
Allis-Chalmers district offices in all principal cities and many foreign countries will be pleased to assist in problems of motor application for standard or special drives.



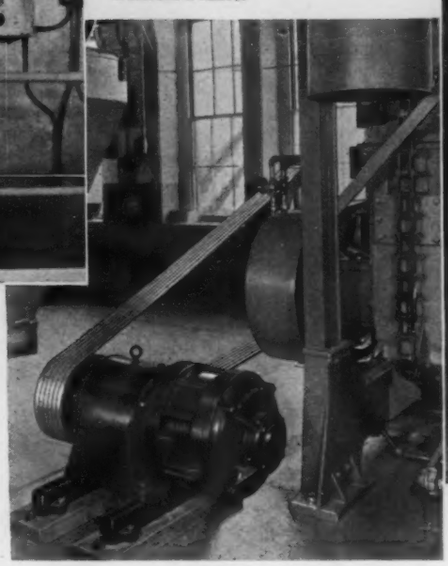
Squirrel Cage Motors driving Allis-Chalmers Flaking Rolls in a Tennessee Cereal Plant.



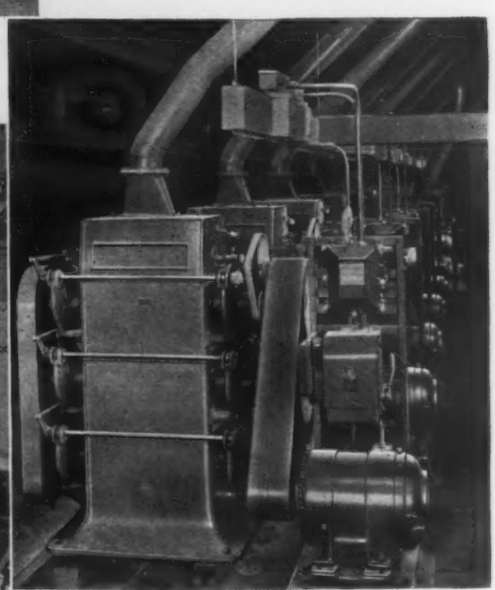
Vertical Motors driving Allis-Chalmers Under Runner Buhr Mills in an Indiana Starch Plant.



Driving an Allis-Chalmers Malt Crusher in a Milwaukee Brewery.



Gearmotor operating Rolls in a Chocolate Plant.



Enclosed Fan-Cooled Motors operating Allis-Chalmers Grinding Mills in a Peoria, Illinois, Distillery.

ALLIS-CHALMERS

Allis-Chalmers Manufacturing Company, Milwaukee

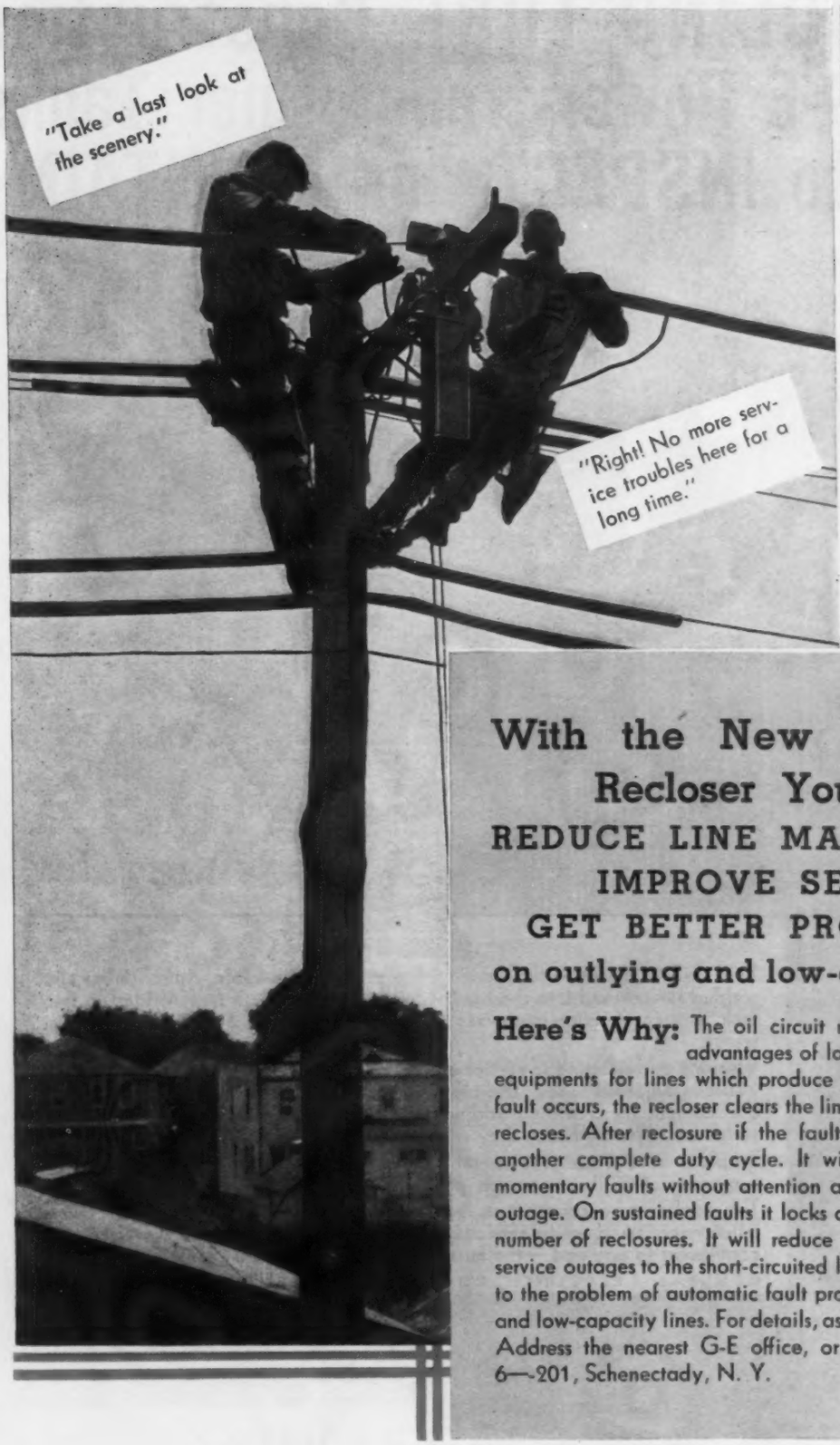
HYDRAULIC TURBINES

FRANCIS AND PROPELLER TYPES AND ACCESSORY EQUIPMENT

WRITE FOR OUR
LATEST CATALOG
"WATER POWER EQUIPMENT"

TURBINE EMBEDDED PARTS—KANAWHA VALLEY POWER COMPANY (London and Marmet Stations)

NEWPORT NEWS SHIPBUILDING AND DRY DOCK COMPANY
(Hydraulic Turbine Division)
90 Broad Street, New York, N. Y. Newport News, Virginia



With the New Oil-Circuit Recloser You Can

REDUCE LINE MAINTENANCE

IMPROVE SERVICE

GET BETTER PROTECTION

on outlying and low-capacity lines

Here's Why: The oil circuit recloser provides all the advantages of larger automatic reclosing equipments for lines which produce small revenues. When a fault occurs, the recloser clears the line and then automatically recloses. After reclosure if the fault is cleared, it resets for another complete duty cycle. It will clear any number of momentary faults without attention and with minimum service outage. On sustained faults it locks out after a predetermined number of reclosures. It will reduce patrol work and confine service outages to the short-circuited line. ● Here is the answer to the problem of automatic fault protection for your outlying and low-capacity lines. For details, ask for Bulletin GEA-2003. Address the nearest G-E office, or General Electric. Dept. 6—-201, Schenectady, N. Y.

810-53

GENERAL ELECTRIC

This COOLING-TUBE Construction Makes G-E Power-transformer Tanks EASY to INSPECT and MAINTAIN

THE G-E tubular-type tank is unusually strong and durable. Round tubes are welded at each end into short radial headers which are, in turn, welded to the tank. This construction minimizes the number of welded openings in the tank wall.

Cleaning and painting in service are easy because ample distance is provided between adjacent tubes. The tubes are swaged at each end, thus increasing the strength by providing additional thickness at the point of welding. All welds are external, hence they are readily accessible for inspection.

To prove oil tightness, the assembled tubes and headers are tested with gas at a pressure of 80 lb. per square inch.

This cooling-tube construction is just one of many reasons why G-E power transformers stand up in service. Every detail of material and workmanship contributes to one end — the most reliable transformer that can be built.

GENERAL ELECTRIC COMPANY, SCHENECTADY, N. Y.

310-3

GENERAL ELECTRIC

"Let 'er Storm"

"WEATHER DOESN'T BOTHER RELIANCE U·R·C· WEATHERPROOF WIRES AND CABLES"

YES—let'er storm. Any weather and any temperature is a made to order condition of service for **Reliance U. R. C. Weatherproof Wires and Cables.** Ask for samples now—see for yourself why these wires and cables make replacement due to exposure a thing of the past. "Reliance" Wires and Cables fully conform to U. R. C. specifications. Complete saturation with high melting point compound insures long life despite the ravages of exposure and overloading. Low temperature pliability is provided to meet any bend test or operating requirements. The copper is "right" and braids are of best quality. Processes and equipment are not "new" to us. Stocks and manufacturing facilities insure of "Service" comparable to the quality of the product.

[Our specification folder will be mailed to you upon request.]

1831 — MORE THAN 100 YEARS OF PROGRESS IN WIRE MAKING — 1934

AMERICAN STEEL & WIRE COMPANY

SUBSIDIARY OF UNITED STATES STEEL CORPORATION

Pacific Coast Distributors

COLUMBIA STEEL COMPANY

SAN FRANCISCO — LOS ANGELES — PORTLAND — SEATTLE

Ready—

Complete data on WESTON Sensitive and Power RELAYS

Send for your Copy

Here is a booklet which illustrates and describes in detail the full line of Weston Relays . . . the most comprehensive line of related relays ever offered for problems of industrial control. It includes various forms of sensitive relays . . . time delay relays . . . power relays for handling upward of several kilowatts . . . toggle and polarized relays . . . and Sensitrol relays, which are small, sensitive contact-making indicators.

Of particular interest is the chapter on Sensitrol relays. These small contact-making indicators are capable of making contact on values down to 2 microamperes or ½ millivolt . . . operating and controlling directly from photocells, thermocouples, resistance thermometers and similar generators of minute energy. The contacts are capable of handling five watts at 110 volts, non-inductive load. They are furnished with single fixed contact, single adjustable contact, or double adjustable contact.

Somewhere in this booklet, you may find a practical solution to your problems, whether they include the control of temperatures, chemical processes, voltages and currents, alarm systems, etc. Be sure to send for your copy today . . . Weston Electrical Instrument Corporation, 577 Frelinghuysen Avenue, Newark, N. J.

MODEL 705
WESTON SENSITROL RELAY
—makes contact on values down to 2 microamperes. Employs a new patented contacting method which assures perfect contact.

WESTON *Instruments*

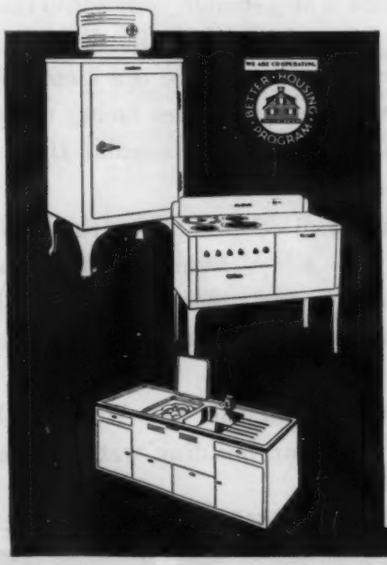
PACIFIC COAST REPRESENTATIVES

Eicher & Bratt,
263 Colman Bldg.
Seattle, Wash.

C. F. Henderson,
420 Market St.
San Francisco, Calif.

Electrical Engr. Sales Co.
Subway Terminal Bldg.
Los Angeles, Calif.

Sales of complete General Electric Kitchens for first 9 months of 1934 are 300% ahead of sales for first 9 months of 1933 . . .



THE modern all-electric kitchen is no longer a dream in the minds of America's homemakers. It is fast becoming a reality. Witness G-E Kitchen sales this year as compared with last year. 300% ahead! Three sales now where only one grew before. And the trend is definitely UP.

General Electric retailers featuring the General Electric Kitchen are in an enviable position. They profit on complete kitchen sales. They profit on sales made under the G-E Step-By-Step Plan of acquiring the complete G-E Kitchen. On this plan it is possible to make 3 *profits per customer*—a refrigerator profit, a range profit and a dishwasher profit.

The National Housing Act now enables home owners to modernize their kitchens on extremely liberal terms. Retailers of General Electric Kitchen appliances are going after this business and are getting it. Using the G-E Kitchen as the background of their sales effort, they are rapidly building a permanent, profitable business that is ever on the increase. Write to the nearest address below for details of the G-E Kitchen plan of selling, and for facts about the G-E franchise.

GENERAL ELECTRIC SUPPLY CORP., Portland • Seattle • Butte • Salt Lake City
VALLEY ELECTRICAL SUPPLY CO., Fresno • GEO. T. BAUDER CO., San Diego
ELECTRIC APPLIANCES, INC., San Francisco
GEO. BELSEY CO. Ltd., Los Angeles • B. K. SWEENEY, Inc., Denver

GENERAL ELECTRIC

ALL-ELECTRIC KITCHEN

HOTPOINT STRIKES A NEW STYLE NOTE IN WATER HEATERS . . . .

New Flange-Type CALROD

• *Calrod, Hotpoint's enclosed heating unit, delivers all the heat generated directly in the water. Seamless copper tubing sheathes the resistance wire and permits immersion in water.*

THERMOSNAP

• *Automatic Temperature Control keeps the heated water at a constant, even temperature — can be adjusted for temperatures from 130° to 200° F.*

• The Vogue, Hotpoint's definitely styled Water Heater, comes into the market at an opportune time. This new style leader harmonizes ideally with modern kitchen equipment, and in basements where appearance is a factor. Hotpoint Electric Water Heaters are potent helpmates to utilities facing the problem of building load and increasing revenue. The new rectangular Hotpoint is a splendid item for modernizing campaigns.

Hotpoint sales experts have planned and cooperated in the building of special water heater campaigns that have added hundreds of thousands of kilowatt hours to utility lines within a few weeks. These sales specialists are ready to do the same for you — prepared to help increase *your* revenue by putting desirable and profitable load on *your* lines.

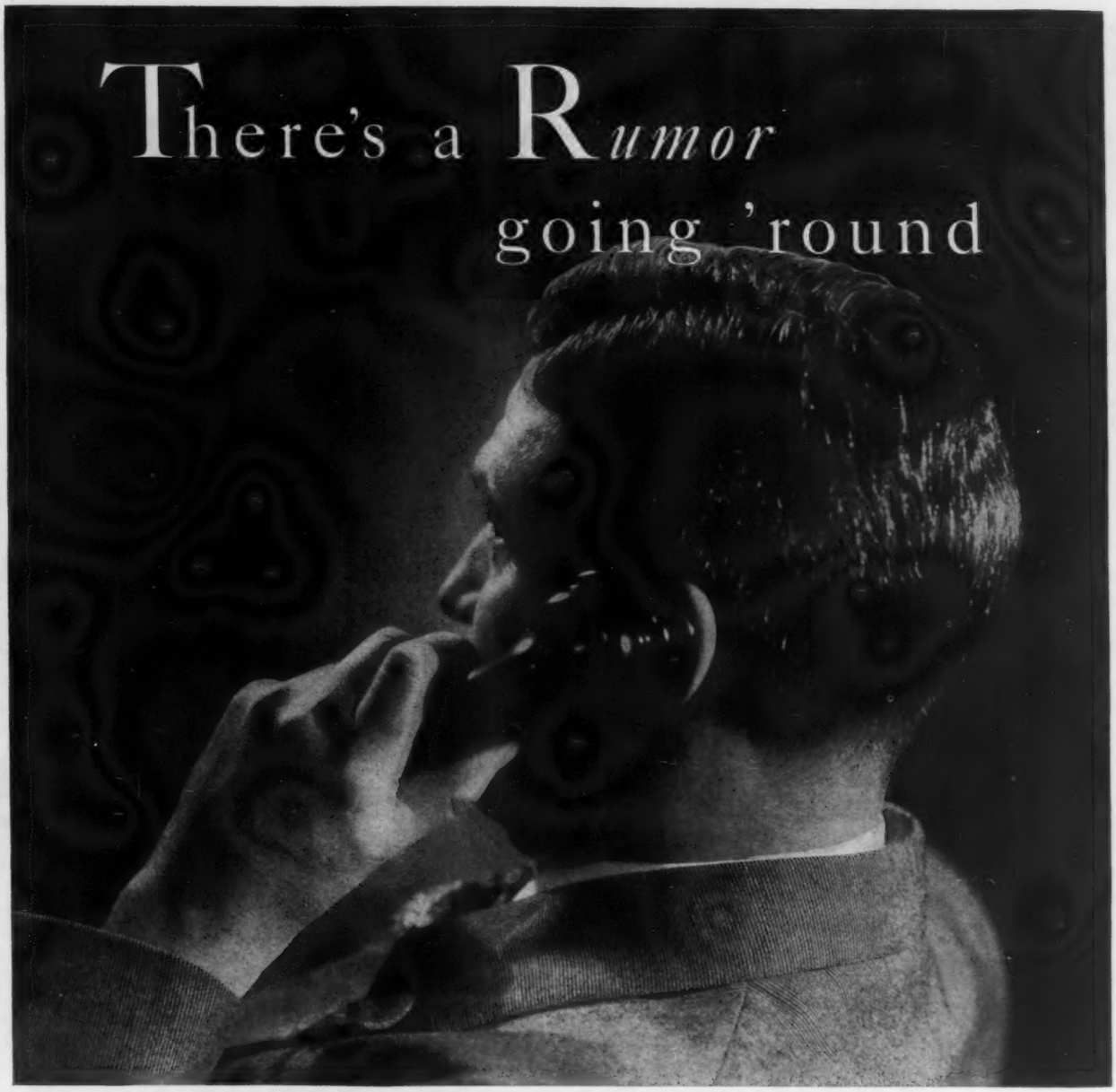
Write today for complete information about this new Hotpoint Electric Water Heater and Hotpoint's 1935 plans for building water heater load.

EDISON GENERAL ELECTRIC APPLIANCE CO., INC., 5612 West Taylor Street, Chicago

The Vogue

• *The new Vogue has 40 gallons capacity; is 19⅜" wide, 21½" deep, and 60" high, outer cabinet is finished in gleaming white baked-on enamel with glossy black trim. It rests on an enclosed steel base with toe space in front, base panel*

ELECTRIC *Hotpoint* RANGES



● There's a rumor going 'round that Frigidaire is about to make an announcement of vital importance to shrewd refrigeration dealers.

This rumor is true.

Frigidaire's Sales Plans for 1935 are almost ready. They embody, of course, all the principles that have proved sound and successful in the past—and many new ideas as well.

If *you* want to stay on the "profit" side of the ledger by swinging along with the leader—now is the time to start.

A letter will bring you advance information. Write to Frigidaire Corporation, Subsidiary of General Motors Corporation, Dayton, Ohio.

Frigidaire

PRODUCT OF GENERAL MOTORS

THE WORLD'S MOST POPULAR ELECTRIC REFRIGERATOR

Immediate New Revenue... From Existing Facilities... Without A Single Penny Invested!

Many power companies are now obtaining much needed revenue without spending any money, by taking advantage of the popular public acceptance of the Wesix Centawatt Electric Heater.

"The Public Likes It."
1250 Watts—110 Volts

$800,000.00 New Revenue!

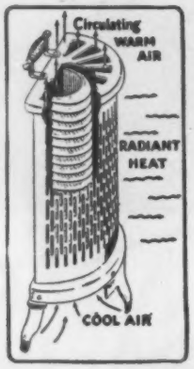
One utility official states that his company is "now obtaining an annual revenue of $800,000.00 from the Wesix Centawatt Heaters added to the lines." This load is so well diversified that no capital expenditure was required—the heaters were served entirely on existing facilities. There was no cost for placing these heaters on the lines—the merchandising profit paid all promotional charges.

"More Revenue Per Dollar of Merchandising Value Than Any Other Electrical Device We Sell"

—states another official referring to the Wesix Centawatt Heater. The public has a limited number of dollars to spend on electrical equipment. The Wesix Heater being low in price will help you obtain the greatest revenue for the least expenditure on the part of your consumers. The selling price is only $7.95—but the heater is 1250 watts.

Here Is What the WESIX Heater Will Do for You!

1. It will re-establish the confidence of your consumers in electric heating because it is the most economical heater on the market. It provides the kind of heating comfort the public likes.
2. It will produce more revenue than any other make of electric heater because it is used more generally—it is truly the "heater of a hundrd uses."
3. Your revenue is assured for a period of many years. Each Centawatt carries a written GUARANTEE OF FIVE YEARS against burn-out. Our slogan for fifteen years has been "Wesix Heaters DO NOT BURN OUT."



Note the Chimney-like core which circulates warm air—naturally

This Is Why the WESIX Is Different

Forget your past bad experiences with other electric heaters. Remember that the Wesix Centawatt is the only electric heater that has ever obtained popular public acceptance nationally. Note the diagram at the left and you will see the reason why.

The Wesix circulates warm air like a furnace throughout the entire room at a normal velocity without fans, motors, or other troublesome moving parts. At the same time a cozy radiant glow of fireside warmth is provided, which satisfies our inherent desire for color. It is really two heaters in one—and the principle and design are patented.
People have told us repeatedly that this is the most beautiful heater on the market. No one can deny that it has the greatest public acceptance of all heaters. Public opinion means more than our own opinion.

Now Is the Time to Take Advantage of the New Interest in Electric Heating

Send for our complete sales plan which tells how other utilities have successfully sold the Wesix Centawatt Heater year after year.

LOS ANGELES
SEATTLE

WESIX

390 FIRST STREET
SAN FRANCISCO

ELECTRICAL WEST

[*Devoted to the economic production, transmission and distribution of electric power and its application to industry, commerce and the home in the Pacific Empire, and to the sale and distribution of electrical utilization devices, equipment and appliances in that area*]

December 1934

Opportunities for the Engineer

By ARTHUR H. MARKWART
President, Pacific Coast Electrical Association

HERETOFORE engineering in the electric utility industry has been confined largely to the design and construction of production facilities but today, owing to the falling off in electric demand and the surplus power in sight from Boulder Dam and other huge projects, engineering talent must be turned into other channels.

There will be some engineering opportunities in the matter of economic distribution facilities for increased load. The engineering of transmission facilities, including condenser capacity and terminal substations, deliver the new and to reroute existing power supplies to load centers wherever they may be, will come into play. However, for the present many engineers rendered idle by recession of business must identify themselves with operation and business problems.

Among other things they can work to reduce operating expenses, survey existing distribution and perhaps transmission facilities with a view of using them in whole or in part to greater advantage in their present position or where insufficient facilities are available, to study low increment cost additions to existing systems, to assist commercial groups in their efforts to promote new uses for electricity, to combat the competition with the isolated plant, to lower the consumer cost of utilization equipment and wiring so that increased use can be encouraged.

They can well afford to study methods of servicing electric appliances, such as ranges, with the idea of reducing the cost to the consumer of maintenance and thus encouraging the use of the equipment. Fear of high maintenance, as experienced by many consumers, is a deterring factor. Most effective work can be done here.

A very fertile field exists in developing, without sacrificing safety, low-cost wiring on the consumer's premises to encourage the use of energy. The present wiring standards are more or less traditional. Under the housing program fostered by the government there should be opportunity for extension of service if wiring costs are not prohibitive. This requires the careful cooperation of manufacturer and contractor. There should be no reduction in safety and if the standards are properly engineered, they will remove the risk presented by those methods now in use by the consumer, such as running the lamp cord across the floor and overloading it by the attachment of too many appliances.

In the development of new load the domestic consumer is not the only field. There should be opportunities in industry for improving efficiency and lowering costs by the introduction of new processes such as heat treatment for producing high grade metals.

The utilities must break away from some of the customs of the past and must study means for developing low cost additions to their plants in order to take on new business at attractive rates. They must not fear to try new methods which may seem radical but which, with careful thought, can be advantageously worked out. As an example, one utility engineering group is trying in residential tracts an underground installation without manholes, the transformer being buried in the ground. Special types of low cost armored cable is being used for service runs without ducts. Low cost secondary mains are being provided by the use of some of the new forms of ducts available. Such developments make it possible to extend into territories that otherwise might not be traversed because of the higher cost of former practice.

We must carefully study the methods of getting new business without increasing facilities—in other words, by the use of such devices as will improve the load factor of the average consumer. An endeavor must be made to do this without expensive attachments in the way of time clocks, two rate meters and like equipment. When we can do this, we can make attractive rates for such business.

In planning new additions care must be taken to make full use of the existing facilities rather than tearing them out and replacing them with new ones. This applies particularly to substations and distribution systems. Careful study in specific cases may show that additions can be made to handle new load at low cost without the necessity of revamping of the existing facilities.

Now that there is an ample supply, a surplus in fact, of low cost power with the trend lower, it is not necessary to spend capital to reduce losses. Consequently, it may be better to stand a little additional loss at low cost, using funds for the development of new business, which will produce a higher return than could be had by correcting existing conditions on the power systems.

Among other things engineers can devote a great deal of attention to the fundamental economics of distribution engineering. As a rule distribution costs greatly exceed production costs in any line of business; in the utility business it accounts for a large part of the cost, generation being to the order of only 25 per cent. There is not much opportunity to reduce production costs

because of the high efficiencies obtained in generating apparatus and the high fuel economies where fuel is employed. Engineers have done a good job in the production end and there is no reason to believe that similar success cannot be obtained with respect to distribution.

On the face of things it would appear that we are in the "dark age" of utility engineering. This may be true for a time with respect to production, but it would seem that there is great opportunity for engineers to enter into activities relating to the business as a whole.

My reading informs me that the region in the vicinity of Boulder dam is rich in raw materials employed in the electrochemical and electro metalurgical industry. There are large deposits of iron ore in California. San Bernardino County has a deposit of at least 5,000,000 tons of magnetite 150 miles from the dam; 200 miles away in Riverside County is another deposit estimated at from 20 to 75 million tons. Large rock salt deposits containing at least 25,000,000 tons exist in Virgin Valley, 50 miles away. Within 150 miles at Bristol Dry Lake in San Bernardino County, both rock salt and calcium chloride occur in inexhaustible quantities. Tungsten is available at Atolia. There are probably other minerals and metals in California within commercially practicable distances of the dam.

The capability at Boulder Dam is 4,330 million kw.-hrs. of firm continuous output or 665,000 hp. In addition there is the 1.5 million kw.-hr. of secondary power which may seek a market pending ultimate use by the Metropolitan Water District to whom it is assigned. If the low capacity factor installations as now planned for the firm power is made, this secondary power can be sold at the dam for about one-half mill per kw.-hr. The cost of firm power at the dam will not be in excess of $17 per hp. year and this cost could be reduced if power outlets of high load factor could be secured, thus permitting the installation of less capacity at the dam than the 1,317,500 kva. contemplated and from which the firm power cost is derived.

Of this 665,000 hp., 58,300 hp. has been permanently allocated to the private utilities in southern California. In addition, these utilities are obligated to take for a time 117,000 hp. allocated to the states of Nevada and Arizona. Under the circumstances, it would be good business to find an outlet not only for power permanently allocated to the utilities but also for that temporarily allocated, in order to rid themselves of this commitment.

Many of the deposits mentioned and perhaps others, exist in Nevada and Arizona. Utility engineers, with the technical aid of metallurgists and chemists, could conduct a comprehensive industrial survey of the region to determine the possibility of developing these great natural resources. Then the industrial survey together with studies on the cost of power at points of use then can be given to the commercial departments to develop the actual prospect.

To my mind this outlines something, particularly for southern California, that will benefit the industry to a greater extent than the other things mentioned. Engineers, because of their general familiarity with technical subjects and their peculiar fitness by reason of training and experience in solving problems, are particularly qualified to conduct such industrial surveys and power cost studies.

The thing to do is to get busy and get rid of the kilowatt-hours because they cannot be plowed under like cotton nor killed off like pigs. Cooperation between engineers and salesmen will dispel the power surplus.

P. C. E. A. Prize Contest Rules

Get Your Share of the $680 Prize Money Offered For the Best Solutions to These Eight Problems

PRESENTED in this issue of ELECTRICAL WEST are the eight problem papers (together with complete discussion of each) that comprised the program of the San Francisco and Los Angeles meetings of the Pacific Coast Electrical Association. For the best solutions to each problem the P.C.E.A. is offering the following prizes:

First Prize $50
Second Prize $25
Third Prize $10

Every member of the Pacific Coast Electrical Association, except those listed below, is eligible to compete and encouraged to submit solutions in accordance with the following rules:

1. Contestants are not necessarily limited to the items or the specific data included in the situations presented by the authors of the problem papers. Solutions must, however, remain within the general scope of the problem. Originality and initiative will be given due credit in judging the solution.

2. Solutions must not exceed the following limits:
5,000 words for engineering problems
2,500 words for commercial problems

3. Solutions need not cover all of the phases of the problem presented in the problem paper. Solutions to one or more phases will be accorded full consideration by the judges.

4. Contestants may use the data and situation prepared by the author of the problem paper, may base a solution on a specific situation, or may assume a hypothetical situation if consistent with fact and has a practical application to the problem presented.

5. Solutions must reach the office of the Pacific Coast Electrical Association, 601 W. 5th St., Los Angeles, California, not later than midnight March 1, 1935 to be eligible for prizes.

6. Papers will be judged primarily upon their value to the industry in solving the problem. Neatness, originality, initiative, and practicability will be given due credit by the judges.

7. Prize papers will be published in ELECTRICAL WEST as soon as possible after the judges have reached a decision.

8. All members of the Pacific Coast Electrical Association are eligible except:
Officers of the Association and members of the Guidance Committee,
Company executives, department heads, district and division managers.

9. Papers will be judged by the Guidance Committees of the operating Economics and Business Department sections respectively.

By presenting the complete problem papers and the full discussion of each in this isue of ELECTRICAL WEST, the P.C.E.A. gives each entrant an equal start. Get into the Contest!

Longer Working Hours for Existing Facilities

By S. J. LISBERGER
Chief of Division of Electrical Distribution and Steam Engineering, Pacific Gas & Electric Co.

BEFORE proceeding to present the problem, a short discussion of the objectives may make the presentation somewhat clearer. During the years when the load of utility systems was growing rapidly, your attention was largely centered on meeting the demands for increased service on your system. Distribution lines and appurtenances were extended in the new territory and if the load became too great on the existing facilities and on the local substation, piecemeal changes were made in a given location. The major generating and transmission facilities required a longer time for development and construction and, as past experience showed no decrease in load, these developments somewhat pre-dated the actual load growth.

Conditions, however, have changed. Where it was formerly a task to meet the growth, it has now become a question of how to develop load to make use of all of the facilities now available. Because of economic conditions, certain loads formerly supplied have decreased and today a distribution system may be more lightly loaded than some years ago and certainly there is some margin of generating facilities above that necessary for the load at hand.

The economic upheaval brought demands for lower rates; the manufacturers of isolated power producing units and the low cost of certain types of fuel intensified this situation notwithstanding the fact that the utilities for many years have been constantly reducing rates. It has always been the desire of the utilities to sell their product at as low a rate as possible and we cannot cease our efforts in still further endeavoring to lower our sale prices.

Needless to say, the question of developing new types of load is intimately involved with the question of rates, but this latter subject is not within the scope of this problem. However, if we can suggest definite methods of taking on certain new types of load without materially increasing the capital investment, the rate question may be much easier to solve.

The Problem:

From the Operating Standpoint, What Types and How Much Additional Load Can Be Added to Existing Electrical Facilities

It is, therefore, apparent that the primary object of this problem is to work out methods for taking on new load that will not require capital expenditures and that the existing facilities be used to supply as many kilowatt hours as possible, due consideration being given to the limitations of the generating and transmission apparatus to supply this additional output.

In considering this problem, it is most probable that additional load cannot be obtained without the addition of some facilities such as a new service and meter, perhaps change in the meter size, the addition of some secondary mains, minor increase in distribution transformer capacity, and devices on the consumer's premises to limit the demand. If the feeders from a substation are well loaded, additional load may be obtained by constructing a new feeder, particularly if such load will not require addition to main substation facilities. The major or minor transmission lines may be tapped for new load if the hours of use fit in with the load of the system in such manner as not to require an increase in generating and transmission facilities.

If the new types of load should require a greater kilowatt hour consumption than the existing facilities could furnish, some addition to the generating facilities may be justified, for example, assuming the system under discussion had now an excess capacity (over and above that required for emergency purposes) of 15,000 k.w. and that said system could deliver 100,000,000 kw-hr. per annum more than is now being delivered. If, at reasonable cost, the generating facilities could be increased by 10,000 kw. and with the new load added, you could deliver 150,000,000 kw.-hr., such an installation may be entirely justified and such a solution would be considered as favorable.

If the new consumers added to the system have loads of the same type as those now using our product, we will have to continue to add facilities as in the past. This we do not desire to do. We would much rather increase the sale of energy at a minimum of added expenditure. How are we going to do it?

Fig. 1 illustrates a typical system which has been developed over a period of years; it supplies a diversified territory. In presenting solutions to the problem you may take your own system or a hypothetical one that approaches any actual conditions of today. You may assume that the generating facilities are from steam or hydro sources or any combination thereof. It is, however, advisable that you know the general characteristics, the type of connected loads, and the essential features of the system with which you are to work.

It is assumed that the three typical areas supplied are:

1. Strictly metropolitan.
2. Combined urban and rural.
3. Predominating rural area in which there are a few small towns.

The metropolitan area is divided into three zones:

(a.) Residential.
(b.) Commercial, in which there are small and large buildings, stores, hotels, restaurants and theatres.
(c.) Industrial.

Fig. 2 is the load curve for a residential territory on an average winter day, the sharp evening peak being typical. The feeder has a capacity of 1400 kva.; distribution transformer capacity connected to feeder 1313 kva.; the ratio of feeder peak to distribution transformer connected is 80 per cent.

This substation is fed at generator voltage and provides stepdown facili-

ties for a 4-kv. distribution system; the main substation bank is 12,000 kva. capacity and is loaded to 83 per cent over the peak. There are ten feeders out of this substation into the residential area.

In such a zone there is but little diversity between feeders as the consumers are of the same general class. The annual load factor on the substation is approximately 27 per cent. The winter peak on both substation and feeders is usually higher than that in summer. It is quite evident that during a large part of each day but little load is being used by this group of consumers. Here is a fertile field in which to work. How will you approach the problem of loading this part of the system during those hours of minimum use? What can you suggest to be done in a zone of this class to dispose of more kilowatt hours without materially increasing the existing facilities?

A feeder in the commercial zone is shown in Fig. 3 for a day in May. The shape of the load curve is typical of a downtown metropolitan district; a high load during the day followed by an evening peak somewhat higher than the day load, this being a result of certain small shops that keep open rather late, window lighting, restaurants, theatres, lighting in hotels and some janitor work done in the larger buildings in the early evening hours.

The maximum load on this feeder is 1580 kva., total distribution transformer capacity connected thereto, 1810 kva. The substation bank feeding this group of feeders is loaded to 90 per cent of its capacity but the annual load factor of such a substation is only approximately 32 per cent. Every feeder from a substation supplying this type zone is not loaded in the same way as certain feeders may have less hotel, theatre, and restaurant loads; also there will be a decided difference in the time and amount of the maximum load on summer and winter days.

The character of occupancy here is distinctly different from that in a residential zone and the loads that might be added in a residential zone may not be of the same type as those possible in a commercial area. What type of development are you going to propose in this case?

The picture presented for the industrial zone is shown in Fig. 4 and is what would be expected for a manufacturing territory, that is, a fairly steady day load from 8 a.m. to 5 p.m. and then a long period with but little load on the feeder. If all of the feeders in the industrial area have the same characteristics as that shown in Fig. 1, the substation bank feeding such group will have the same general load characteristics as the feeder. It may be, however, that there is a residential area contiguous to the industrial and some of those feeders that feed the manufacturing load may extend into the residential area, thus taking advantage of the diversity between the two types of load. If such a type of loading can be obtained, the investment in feeders and substation facilities can be reduced. However, there may be problems incident to voltage regulation where two distinctly different types of load are supplied from the same feeder and power factor conditions may likewise affect the regulation. Assuming that the above type of combination load can be supplied from a single feeder, there is still a considerable period during certain hours of the day that the supply facilities carry a very light load.

This zone presents a different problem from those previously shown, in that there are possibilities for development of load of different characteristics because of the different types of occupancy. Furthermore, there may be a marked difference in the time of maximum load, not only during the day but in certain periods of the year, should the residential demand overlap that of the manufacturing during the winter months.

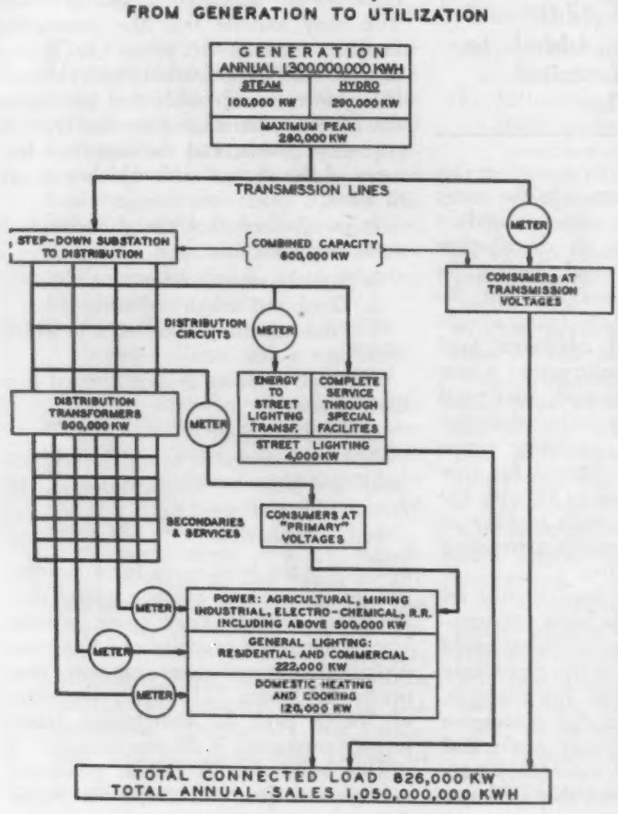
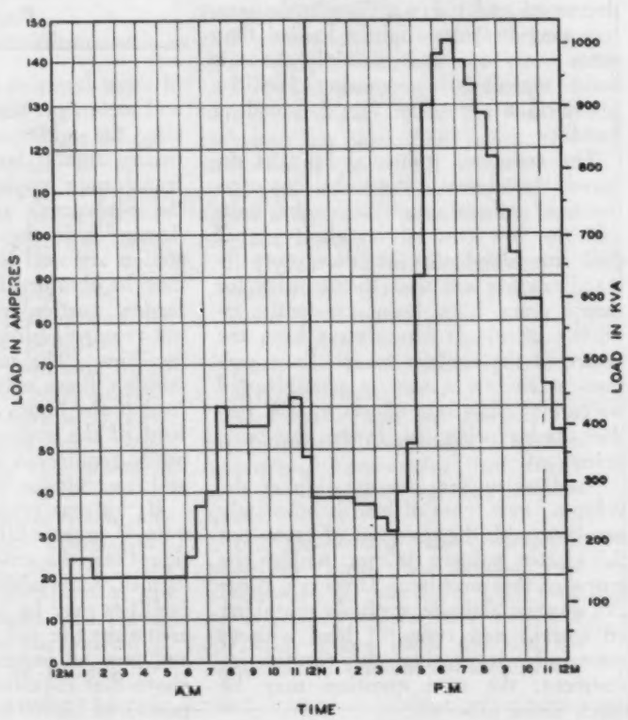


Fig. 1—Channels of energy distribution from generators to consumers for a typical system

Fig. 2—Typical residential feeder loading in a metropolitan area on Monday, Jan. 8. Connected transformers total 1313 kva.



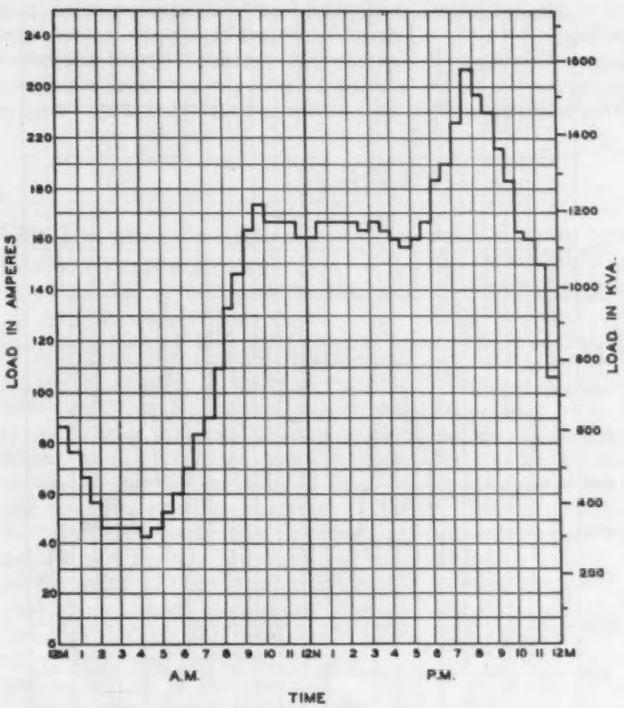


Fig. 3—Load curve of a typical commercial feeder in a metropolitan area for Monday, May 26. Connected transformers total 1810 kva.

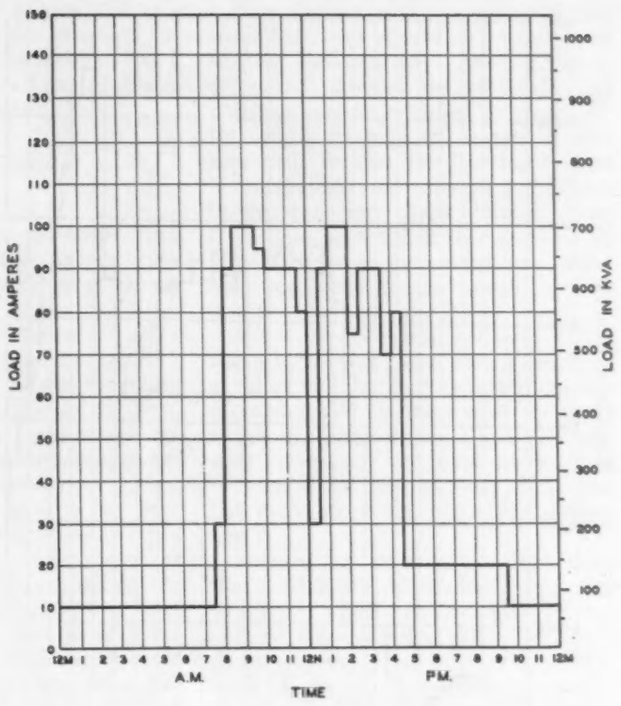


Fig. 4—Load curve of a typical industrial feeder in the metropolitan area for Wednesday, July 6. Connected transformers total 925 kva.

Can you work out any plan whereby the existing facilities can be made more useful? Can you add certain types of load that will not require an excessive amount of major additions? Here are opportunities for ingenious development.

The consolidated load curve of the metropolitan area is shown in Fig. 5. This curve has the same general characteristics as that shown in the other curves, namely, periods of heavy loading but during a large part of the 24-hr. day, particularly the early morning hours, many of the facilities are lightly loaded. With the type of consumer that we supply today, it is doubtful if the annual load factor of such a metropolitan area will exceed 45 per cent.

In an area which is both urban and rural, the shape of the load curve is as shown in Fig. 6. If in such a territory there are residential and manufacturing areas, the load curves for those areas will be similar to those previously shown for the metropolitan zones. In California, the rural territory usually has a considerable amount of irrigation for truck gardens and ranches. There are also quite a few residential type consumers in such a territory and therefore there is some difference in the load characteristics due to the seasonal and daily requirements of the several types served. A typical load curve for a rural feeder is shown in Fig. 7, the load being shown for a day each in May and October. The combined load of this area is shown in Fig. 6, the day being the same as that taken for the maximum load on the rural feeder shown in Fig. 7. The seasonal characteristics of this load is different from that of the metropolitan area. In a normal year (not a dry year) it is probable that the annual load factor on the irrigation feeder will not exceed 22 per cent and in the combined area, it will not exceed 32 per cent. Stated in another way, there is not only a large part of the day that certain feeders are lightly loaded, but also a large part of the year that those feeders supplying the rural pumping load are used to their maximum capacity for a relatively short time. In such a territory, how much load can be added? Will it be possible to add certain types of load and still not overload the feeder? If range and other heating loads are added, will there be sufficient diversity between the pumping load and the cooking load? What effect has the power factor of the irrigation load on feeder capacity? Will certain types of load require different types of regulation? What can be done in this area to increase the sale of kilowatt-hours from facilities of relatively large capacity that are loaded only during seasons of the year?

The next area to be discussed is one that is largely rural and in addition thereto, there are some small villages here and there. This area is supplied by means of four 11-kv. feeders, the heavier loads being fed at 11-kv. and the more scattered area being fed through stepdown substations at 4-kv. The load in this territory for the months of July and December are shown in Fig. 8. The maximum load is approximately 7300 kva. in July; the total connected distribution transformer capacity in the area is 18,810 kva.

In this territory there are small ranches, truck gardening, some residential consumers, and a few small manufacturing companies; there is a wider diversification in load than for the area shown in Fig. 6. Notwithstanding this diversification, the ratio of distribution transformers connected in the area shown for Fig. 8 to the maximum peak load is less favorable than in the other areas. The load is less dense as the consumers are more widely separated than in the other areas and there is but little opportunity to feed more than a very few consumers from a single transformer or bank of transformers. The average size of the motors in the Fig. 8 area is less than those in the Fig. 7 area. There is some difference in the shape of the two curves. What is the cause of this? What does it point to?

It is entirely possible that this last territory may be populated by a different type of consumer whose mode of living may be different from those consumers in the other area. This type of territory therefore presents a different problem.

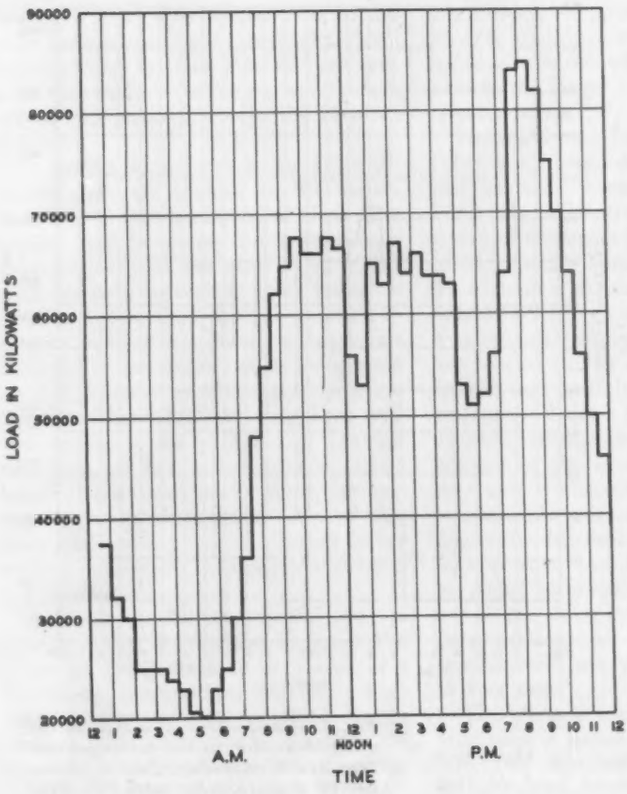


Fig. 5—Typical summer load in kw. for metropolitan area for Friday, Aug. 15

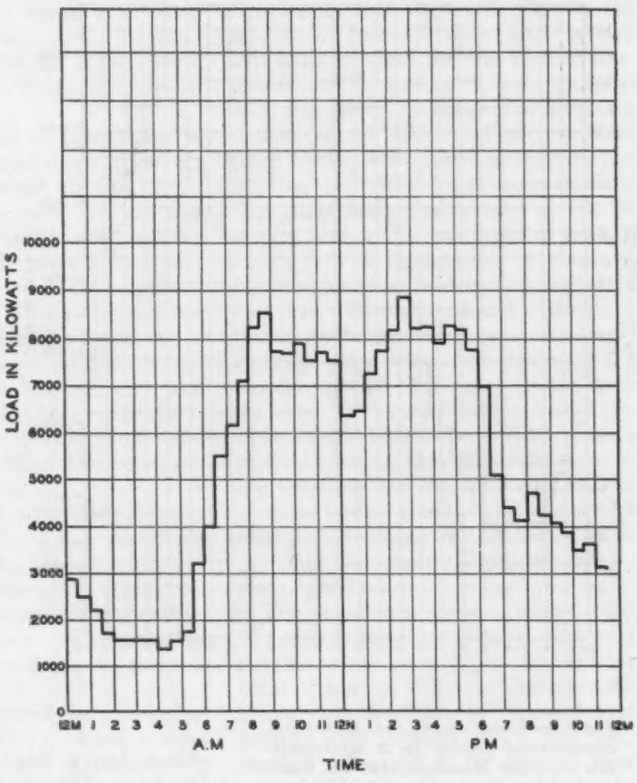


Fig. 6—Total station load for a typical urban and rural area for Tuesday, May 26

The foregoing examples illustrate the characteristic types of loads that may be found in the areas described. However, other factors may enter into the problem of loading a few of which can be briefly mentioned here. It will probably be found that in all areas there is some margin of capacity in many of the transformers except perhaps those transformers used solely for supply in pumping loads. Even those transformers are not loaded during a large part of the year. As transformers are a major percentage of the costs of investment they should be loaded as heavily as possible, but care should be taken not to damage the transformer or to render service that would be unsatisfactory. The duration of the load and the temperature conditions in the territory will have a decided bearing on this question of loading. Transformers of different voltage classes, as for example, 11 kv. versus 2.3 kv. have not the same regulation. A transformer may perhaps safely carry a considerable overload for a short period of time, but the regulation cannot be neglected, particularly, for certain types of consumers. Therefore, both loading and regulation have a definite relation to each other. It is also important to remember that added transformer capacity in the higher voltage class is much more expensive per kw. than in the lower voltage class and, hence, it may be more desirable to add facilities where the lower voltage class of transformer prevails. The question of capacity, power factor of load, and regulation on feeders is somewhat parallel to the distribution transformer problem both as to quality of service and cost.

The capacity of the secondary mains fed from the transformers may require some increase. How can this be accomplished without rebuilding the existing facilities? Such increases in the secondary may be necessary where additional load is taken on and a minimum of facilities should be planned where such increase may take place. What can be done to increase the diversity between different consumers in the same neighborhood? What are you going to suggest to limit the hours of use by the added load that will cause either overloading or poorer regulation on the existing facilities unless you add considerably new capital to prevent same? In suggesting prospective loads that might be added, it is important to bear in mind the character of the apparatus that may be used in such development. For example, in the residential area, single phase service predominates. The addition of any load requiring polyphase service will materially increase transformer, secondary, service and meter installations. Likewise, the addition of motor loads requiring polyphase service or single-phase motors having poor starting characteristics may cause a large increase in capital facilities. The addition of inductive loads may seriously affect regulation. In the rural territories in California, there may be possibility of development where polyphase service is in many cases available. Such loads as might be developed in that territory could not readily be supplied in a metropolitan or urban residential zone.

In the presentation of the problem, I have thus far discussed the question of obtaining additional loads. It may not be possible to so change the habits of our existing consumers as to make use of a large amount of energy during what we now term the off-peak hours. We may be faced with the fact that the larger part of the new load will be from consumers whose uses will be the same as those consumers now connected to our system. You will therefore be faced with the necessity of using your technical knowledge and ingenuity in making the existing facilities carry more load and at the same time not lowering the character of service. What are your ways and means of doing this? There will be new developments and new applications of old principles that will

materially assist in these problems. You can increase the power factor. You can lower the flicker troubles. You can increase the carrying capacity of certain types of apparatus with but minor additions in cost or new facilities.

If I were starting on this problem, the first thing I would do would be—but I must not forget, that is your problem. What are you going to do?

Discussion

Can Existing Facilities Carry Greater Peaks?

By W. C. SMITH
General Electric Co.

IN THE effort continually being made by the utilities to bring down their costs and thereby justify still lower rates, there is nothing, it seems to me, which holds out more promise, than an answer to the question of how to add load to existing electrical facilities. Possibilities in this direction, as pointed out by Mr. Lisberger, lie both in disposing of new load during off-peak hours, and in making existing facilities carry greater peak loads without endangering the apparatus nor impairing service to the customer.

Study may reveal certain types of load now occurring on off-peak hours, in which case efforts can be made to build it up to larger proportions. And the possibilities of developing new types of off-peak loads are surely worth investigating.

The low load factors prevalent today on the average feeder (station or system) constitute a challenge to our ingenuity in devising ways of filling in the dips, without adding to the peaks which determine the investment, and consequently the rates to the customer.

Adding appreciably now to the peak conditions, may there not be many types of load which through proper means, at present available, can be cut off during the heavily loaded periods? Any lowered rates which may prove justified for this class of business will surely react to build up additional consumption and still further fill up the dips in the load curve.

An interesting problem then arises in determining what portion of this load can be cut off through automatic means and what part of it will require some such control as the use of carrier current from an attended substation.

Now dealing with the proposal that additional load should be placed upon existing facilities, what limiting factors at present control the situation, and how can they be modified or removed? On certain parts of the system, it may very well be that the limiting feature is not the carrying capacity but relates to the drop in voltage through them. It will be agreed that this problem of regulation is an important one, being only secondary to the matter of continuity of service.

Where the line-drop seems to establish a bottle-neck, what means are there of reducing it without changing the size of conductor? Is there a choice as to series or shunt devices, and can any such equipment not only be used to counteract the reactive drop of the line but even affect the resistance component?

Perhaps an investigation will show the availability of modern regulating equipment which can not only vary the voltage automatically, either smoothly or step-by-step, but even add or subtract means of controlling the power factor. Is there a field out in the distribution system for some devices, acting in somewhat the same manner as does the large synchronous condenser

Fig. 7—Load curves for days in May and October on a typical feeder supplying a rural area. Connected hp. 2757.5; total transformer capacity 2797.1 kw.

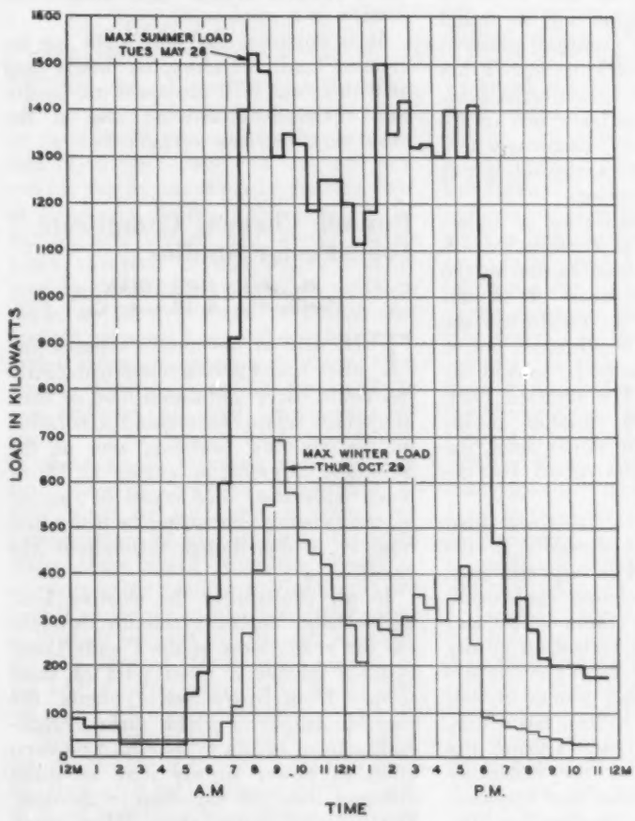
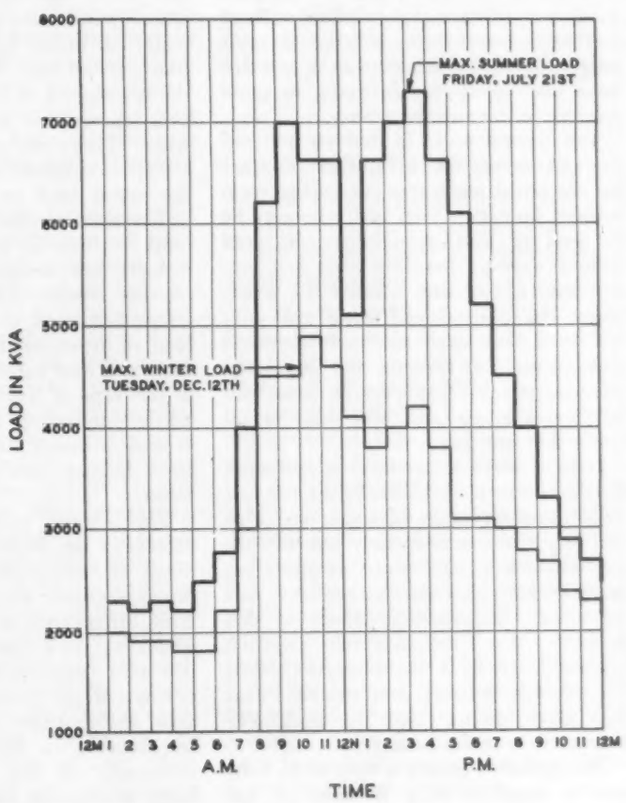


Fig. 8 — Total load for summer and winter day in a rural and suburban area



at the receiving end of our long transmission lines?

If the cost of regulating all the load on certain feeders seems uneconomical, is there any solution to the problem of taking care of that portion of the load whose operation is most susceptible to variations in voltage? Is this limiting variation of voltage entirely a question of magnitude, or is it related to the suddenness of change?

What possibilities are at hand for modifying utilization equipment so as to reduce not only the initial kva. demand but the rapidity of change of current?

Lastly, is some of the modern equipment so much more efficient that it will justify replacement of present installations, or can certain devices now in use be rebuilt at reasonable cost to materially improve operating conditions?

•

Farm Income Important In Rural Load Growth

By H. H. BUELL
Pacific Gas & Electric Co.

THERE are two points in connection with a consideration of this subject which are definitely axiomatic in character and which might well be stressed at the beginning of this discussion.

In the first place, any load which is added to existing facilities must be pay load. It is easily practical to add load in large quantities, if it is added without cost to the consumer, but the primary purpose of this discussion is to provide ways and means for bringing in more revenue to the supply agency.

The second point is that no one can pay out money which he does not have for electrical energy or any other commodity, no matter how badly he may be in need of that commodity. It goes without saying, therefore, that any suggestions which are offered to bring about the desired end shall not only add load, but shall also provide ways and means for helping the consumer pay the bill. They must be beneficial to the consumer and help him to increase his income.

It is at once apparent that any such consideration is very closely interlocked with a consideration of rates, and also that the problem is largely one of selling, requiring very close co-operation must be had between the engineer and salesman. Engineering details of this problem are comparatively simple, especially if it is intended to follow the problem exactly and not to spend any more money than is absolutely necessary to make money.

The problem covers a very wide field and is capable of a number of approaches. In the few minutes available it is impossible to cover them all, and therefore, the one offering the greatest possibilities, from the standpoint of available facilities, has been selected; that of the rural area. At the same time, it is appreciated that it offers the greatest difficulties of solution.

Rural areas have felt the effect of reduced income to a greater extent than any other area and the situation has become so acute that the use of electric energy for any purpose has become almost a luxury in a great many cases. California is in a very difficult position because of the fact that a larger number of rural consumers are served with energy than in any other section of the country. Capital investments in lines per dollar of revenue are exceptionally high and it is a well known fact that the urban consumer must subsidize the farmer in the cost of electrical service as well as in other commodities.

Not only has the anticipated load for which rural electric lines were constructed in advance of the demand, in accordance with best engineering practice, not materialized, but also the existing load has gradually dropped off. Witness the large number of idle transformers or extensions in many localities.

There is, accordingly, a two-fold problem in this rural area: add new load, and keep the present load. Competition by various forms of competitive power has taken its toll. Even the second-hand auto engine will be found installed, belted to a pumping plant in place of an idle electric motor. From the standpoint of the agriculturist however, the matter is entirely one of income. There are many instances where unexpected funds have immediately put the motor back in service.

The most serious indication of underload facilities in rural areas is the extremely low annual load factor on the circuits feeding such areas. It should be remembered that in California the load on these circuits is primarily power load and that relief must be looked for in this type of load. The domestic load, while important and capable of increase, is minor to the power load, the lines having been constructed for the latter.

The primary cause of this low load factor is the lack of diversity in the kinds of crops raised in a given area. Some sections are almost exclusively fruit, others rice, still others cotton, and so forth. As a result, irrigation in any one area requires the simultaneous operation of all pumping plants in that area, and that operation lasts but a very few months in the year. During the remainder of the year the extremely large investment in lines and transformers installed for this purpose lies idle. Is it possible to change, through education, the entire method of living of the average rural consumer, to teach him to diversify his crops, to rotate them during the year, to assist him in marketing his crops, realizing that he also must be benefited and his income increased.

An example of the effectiveness of this plan might be of interest. A few years ago two substations in rural communities in the same general location had the same annual load factor, approximately 17 per cent. It is realized that such a load factor is very low, but it is typical for such circuits. As time went on the type of crop in one substation area began to change, fruit trees being pulled out and replaced by truck gardens in many cases. The load factor on that station increased in 1933 to 25 per cent, the other remaining at 17 per cent, a 50 per cent increase in load factor.

Various other suggestions might be made for increasing the kw.-hr. load on suburban lines. Under present schedules, the overhead charges on irrigation equipment are written off in the summer months. What is to prevent utilizing the same equipment where practical to supply house heating in the winter months at very low rates? Various electric schedules provide lower rates during off-peak hours. Cannot irrigation load be supplied under the same conditions, particularly at night when evaporation is a minimum?

It is apparent that any plan for increased load, therefore, is closely tied in with rates. Will increased use justify rate revisions downward and at the same time increase revenues?

•

Run-off Changes Complicate Load Factor Studies

By J. P. JOLLYMAN
Pacific Gas & Electric Co.

THE title of the author's paper implies that existing electrical facilities could carry additional load at least of certain types. In seeking a solution of the author's problem, one of the questions requiring an answer is: "How much additional load could be carried by the existing generating facilities and how is it distributed throughout the year?"

In all probability the existing load varies from month to month throughout the year. Most of the Pacific Coast systems receive a good part of their supply from hydroelectric plants, the possible output of which varies considerably from month to month. The variation in power supply may be quite different than the variation in demand. The question arises, then, "How much

margin exists between generating capacity and existing load, and how is this margin distributed throughout the year?" The output of many hydro-electric plants is reduced in dry years. Where hydro supply is involved, do not dry year conditions determine system capacity and establish the available margin between capacity and the existing load?

The load factor at which additional load could be carried should be ascertained since it may influence the type of load that can be added to the existing facilities.

In nearly all cases power must be transmitted at least some distance from the generating plants to distribution centers. The question should be asked, "Does the transmission system limit the possible output of the generating stations? If so, what is the nature of this limitation? Will the transmission of additional load result in low voltage due to excessive line drop and would loads of better power factor permit the transmission of a greater amount of power?"

Is not a fairly accurate knowledge of the capabilities and limitations of the generating and transmission systems essential to a full solution of the author's problem?

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Can Idle Facilities Be Used More Effectively?

By L. A. BUESE
Los Angeles Gas and Electric Co.

THIS idea of excess capacity builds up many false hopes as to what can be done by its use. Study the distribution of excess capacity on any one system; is this excess capacity concentrated at some one point on the system? If so, we can try to add several large blocks of load at that point. But, if you find that this excess capacity is made up of a kilowatt of excess secondary capacity here and a kilowatt of excess transformer capacity there, then what? Must we confine our work to the addition of small increments of load? When the new load exceeds one of these small amounts, must we add some new capacity to the system at that point or will re-arrangement or reconnection of the existing facilities make these small amounts of excess capacity more readily available. If we find it necessary to add some new capacity, shall we add just enough capacity to take care of the new load or shall we add a little excess capacity so that we may keep on worrying?

Hotels, apartment houses and office buildings appear to offer a fruitful field in our search for excess capacity. Most of these buildings have plenty of excess capacity, so probably our facilities serving these places also have excess capacity. What are we to do? Wait for these places to solve our problem along with their own or remove our excess capacity and use it at some other location where it is needed? Can we offer these customers any use of electricity at a rate attractive to them and profitable to the utility?

We all have idle facilities connected to vacant houses and buildings. Is it possible to offer any service to this class? Are we justified, in these cases, in waving a minimum bill?

Street lighting seems to have aroused the wrath of the taxpayers especially in those cities where he is taxed directly for current and maintenance of ornamental street lighting systems. In many cases the amount of lighting has been reduced at the insistence of the taxpayer. Is it possible to appease his wrath and salvage part of this lost load by cutting the amount of lighting only during the seasonal peak load period?

The old street car and its electric load is having a hard struggle for existence. Can anything be done to require the greater use of electricity in either bulk or individual transportation?

In order to fill in the valleys of our load curves, it may be necessary for us to step outside of the straight electrical engineering field and devise new methods of storing water under pressure, of heating citrus orchards on cold nights, or to provide temporary heat in the cool fall and spring mornings. A study of the types of load which we have added to our systems in the past would undoubtedly help in deciding what types of load we may expect in the future.

First we have our good old standbys such as lighting and motors to fall back on. It is possible that new uses may be found for this type which will increase our sales, use up our excess capacity and fill in the valleys of our load curves. In this type of service, we have a practical monopoly. Second we may increase our efforts in securing that type of load which is in a highly competitive field. Competitive rates must enter into the securing of this type of load or else we must offer something, so necessary, so exclusively electrical, so superior, that competitive rates are not necessary. The field to work on is large but the addition of load must be justified economically. Third, we may find that the backbone of our business is of that type which is best served by electricity exclusively. The industry has made its greatest studies by the development of this type of load. How much has the radio and refrigerator meant to the industry in the last ten years? What will television and air conditioning mean in the next ten years? Is any additional capacity required for this type of load? The possibilities of this type of load are unlimited.

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Study Off-peak Usage

By J. C. CAREY
Southern California Edison Co., Ltd.

THIS problem is probably one of making our distribution facilities work longer hours. After all our generating and transmission facilities have been developed on a magnificent scale. What, then, can we do to decrease the ratio between capacity in the distribution system and the remainder of the system? Possibly the solution lies in adding large blocks of load via the off-peak route. Certainly a part of the solution of this problem will be found in means of filling in the valleys of the load curves shown by Mr. Lisberger.

This study, however, makes it imperative to determine just how much off-peak kw.-hr. really cost. If we consider increment cost only, off-peak rates should be low. The cost must be low enough to induce consumers to make strenuous efforts to adapt their usage to take advantage of off-peak rates. Perhaps day-time store lighting on a larger scale, winter house heating in rural areas, reservoir pumping and other uses can be stimulated by low off-peak rates. There is a wide field of investigation open not only to the engineer but the power salesman in this connection.

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Can New Loads Be Devised To Fit Off-peak Limits?

By H. H. MINOR
San Joaquin Light & Power Corp.

TO PROMOTE an entirely new class of consumer who will fill the gaps in the load curves referred to would be ideal. What type of consumer would make use of our facilities on a typical residential feeder in the early morning and afternoon hours and be considerate enough to do without "everybody's servant" from 5:00 P.M. until 11:00 P.M? Is off-peak water heating or industrial load the answer?

By combining these types of load on one feeder in the right proportion a daily load curve of almost ideal characteristics would result. But is it a practical possibility to do so?

Industrial load added to the typical commercial feeder would raise its load factor it is true, but there still would be a large early morning volley. How could that valley be filled?

In the rural or combined rural and

urban areas the load curves show a decided day time peak. How can the night load be built up? The suburban and rural load and the rural area show a vast difference between summer and winter. How can this difference be eradicated so as to take advantage of existing facilities throughout the year? How about low rate heating and more off peak water heating? Can winter irrigation be sold, or can 24-hr. pumping be accomplished, in order to more nearly approach the 100 per cent load factor load?

Any of the above may be possible in some instances and any will prove a help. Are there not other possibilities however, that should not be overlooked. Is it only the new type of load, the new consumer with an ideal cycle of use or changed practice of our existing consumers that will fill the gaps in the daily and yearly load curve?

Our domestic loads are increasing normally, other loads show a healthy tendency to grow. Cannot they be added to existing facilities in many cases? Is it not possible to load up those facilities to a greater extent than has been our practice? Are our distribution transformers doing their utmost? Are distribution feeders fully loaded? Does that new cooking consumer require an additional transformer or can we serve him from one already up? Can we not serve those additional lights from the three phase bank near the house instead of hanging a lighting transformer? Is that distribution feeder of capacity enough to handle that added machine shop load? Why is it necessary to increase that long secondary to care for a refrigerator?

To many such questions, voltage regulation or lighting dips or advisable two way feed may be the answer. Or fear of transformer failures with their attendant interruptions to service may be claimed. May we not be over-stressing these possibilities at considerable cost for added equipment? Are not methods available to care for some of these troubles at less expense than the added facilities? A study of these questions may be enlightening.

The solution of this problem and of the others being discussed should answer these and like questions. The results that should be obtained from the other three problems should help solve this one. The reduction of distribution costs will undoubtedly result in more adequate use of existing facilities. The provision of better regulation will promote the loading up of lines and transformers. The customer repair and maintenance service will, if continued or increased, result in customer good will and prove a load builder, thus providing additional load to add to existing facilities.

In short, while any steps that can be taken to smooth out the typical load curves of our existing consumption by adding new customers whose load has the desired characteristics will go a long way toward the proper utilization of existing electrical facilities; the normal load growth if carefully handled will also provide a means of advantageously loading up those same facilities. Do not overlook routine planning in your attempt to utilize existing equipment. Remember that no load justifies greater cost to serve than will provide reasonably trouble-free satisfactory service.

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Rural Load Factor Is Knotty Problem

By C. A. PEERS
Pacific Gas & Electric Co.

ALL the load curves presented show a uniformly low consumption between the hours of 12 midnight and 7 a.m. With very few exceptions, any additional load taken on during this time could be taken care of by any of the existing facilities — generating plants, substations or feeders—except additional services and meters and possibly load limiting devices.

The type of load that can be taken on existing facilities is much more difficult of solution because it involves the cost to the customer of utilization equipment, as well as putting a limit on the time during which he can use the equipment. This greatly narrows the field of consumers who can adapt their energy needs to the off-peak hours, whether it is the period from 12 a.m. to 7 a.m. spoken of or during other periods of the day or seasons of the year that are off-peak for the particular system, generating plant, substation, or primary feeder.

In the Salinas territory, the summer peak caused by agriculture pumping is about three or four times the winter peak. This would seem to offer an excellent opportunity for developing a winter load. However, an analysis of the situation presents several difficulties. In the first place, about 90 per cent of the urban territory is served with natural gas. In the rural territory the consumers are few who have any use for large quantities of power except for irrigation pumping.

As an example of this, I might say that we have one substation of 3,000-kva. capacity that has 2,523-kw. maximum demand in July or August and during these months has sometimes as high as 87 per cent monthly load factor. During the months of May, June, July and August it has an output of 3,400,000 kw-hr. and during the remaining months an output of 1,400,000 kw.-hr., having as low a monthly output as 37,000 kw.-hr. in the winter months.

Outside of agricultural pumping, this station serves only 13 domestic consumers. It can readily be seen that with even the homes of these domestic consumers electrically heated the winter consumption would be relatively small. This, of course, is an extreme case.

In contrast with this we have a station of 2,250-kva. capacity serving an agricultural community, including a small urban settlement. This station has a 960-kw. maximum demand occurring in the months of July and August and during these months has a monthly load factor of 41 per cent with a winter demand as low as 448 kw.

This station serves 574 domestic consumers and is located on the coast where the summers are very cool in the evenings and would offer a very excellent opportunity to develop a heating load. Unfortunately, however, the people throughout this community are of very moderate means and very few would have money enough to provide wiring facilities and purchase equipment to utilize energy if they got it for virtually nothing.

It would seem to me that it is going to be very difficult to develop a very large off-peak load except in the industrial field.

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Coordinated Load Building Will Help the "Net"

By W. WESLY HICKS
Wesix, Inc.

THE paper with its examples of present problems and load curves is most illuminating. Think how a live utility sales department can plan its sales efforts with this sort of information in its hands. Some one has said, "A problem clearly stated is half solved." Here is a case where the problem is not only clearly stated but where the engineer acts as correlator between the engineering department and sales department and makes the job perfectly obvious.

This paper will start some fundamental thinking, and when thinking starts the other half of such problems solve themselves. High load factor equipment, time, temperature, and demand control devices will be more fully appreciated with this information available, and load building efforts can be based on a specific purpose emphasized where the load is most desired or necessary. Inexpensive automatic load controls, timers, etc., used heretofore to help the consumer keep his minimum

down, will now prove their true worth.

Most important of all, we have the promise of closer cooperation between the engineering departments and the sales departments, and joint familiarity and agreement as to type of load building, even to the point of naming the locality where effort should be concentrated.

In these days, rates are truly inducement rates and our industry has no longer a leg to stand on when it complains about rates. Our rates are lower now than any one of us ever dreamed they would be in our time, and more favorable, everything considered, than so-called yardstick rates being offered in the Tennessee Valley and other places.

One has only to be familiar with the service rendered by utilities outside of California and their practices to appreciate the nearly perfect service being rendered in California, and especially to appreciate the trend, at least in this locality, toward simple rate structures in keeping with the times.

It seems to me that the problem of the utility is similar to the problem we have in our own factory, in its efforts to balance production and sales. In the case of the utility the Engineering Department must depend on the Sales Department to dispose of its commodity represented by surplus kw.-hr.

So many obstacles to the sale of load building equipment have been cleared away now that there is nothing left for the industry to do but take advantage of the favorable situation and obtain a lot of business for itself. In this connection installation costs should be studied to reduce still further the overall costs to the consumer of using appliances.

The burden the utilities have carried during the last five years has been terrific, and the natural aid to the solution of the problem is to load existing facilities. One utility executive is quoted recently as saying, "When we once again have reports coming in from the territory that a transformer or two has burned up, we will know the depression is over." Let us all do our part to at least start warming up the transformers, but at the same time give more attention to developing favorable annual load factor. Surely the utilities are doing their full part with rate reductions and cooperative load building efforts.

What Economies Can Be Made in Distribution Costs?

By WILLIAM E. ROW
Distribution Engineer, Southern California Edison Co.

IN THE past few years, the attention of electrical utility executives has been turned from the problems and fascination of building generating plants, picturesque steel tower lines over yawning chasms and high mountains to the prosaic necessity of providing capital for the unromantic job of constructing distributing lines.

Expenditures for distribution during the development period formed but a small percentage of total capital disbursements. The distribution engineer was far too busy taking care of the business of the day to do more than a casual job of system design engineering. But even had this not been so, he would have had to have been perhaps more of a prophet than engineer to have foreseen and provided for the phenomenal changes which have taken place.

Today these conditions no longer exist. Our generating stations have been built; our transmission lines form a veritable spider web over the land and our distribution expenditures have become the outstanding item of capital additions.

This fact alone is sufficient to direct attention to the economics of distribution; but coupled with this is the pronounced increase in cost of this element of our business. It is not an uncommon occurrence to be confronted with replacement costs of two times or even as much as five times the original investment cost of a distribution line constructed during the early period.

It is true that material costs have increased and that labor costs are greater than they were a number of years ago, but do these facts account for the steadily increasing cost of distribution while the cost per kilowatt of other elements is decreasing?

Obviously other components must exist in the problems of present day distribution to establish such a condition.

The Problem:

How Can the Cost of Electric Distribution Be Lowered?

In analyzing this question there naturally comes first to mind the thought that our construction must be too good, but if it is too good, why is it so? Are we so bound about by codes, and rules and laws that we can do a thing in only one way, and that, the most expensive way? If that is so, then it is perhaps time that an effort should be made to amend these laws to meet present day conditions. However, let us not lose sight of the fact that the poles and wires which are all that we see and so first in mind, represent, even as important as they are, but one phase of distribution economics.

So, in considering means for reducing the cost of distribution we must approach the problem in its broadest conception and give full weight to such variable and complex features as choice of voltage, fundamental system design, service requirements, density of load, demand, local topography, street layout and ordinances, to mention only a few.

The technical press of our industry has within the last two or three years issued volumes on the subjects of low cost rural distribution, low cost underground, and distribution economics of one phase or another.

Many of these studies have attacked the problem from a purely engineering background, building up an ideal set of conditions, others have approached the subject on the basis of a clean start into unserved territory, but comparatively little has been published on the grim realities of actually changing from some system of distribution now in operation to some other more ideally suitable system and still show the economy of doing so.

Perhaps we of the Pacific Coast are here again faced with a condition radically different than that applying east of the Rockies, which requires a different angle of approach. Our urban territories and our rural territories, par-

ticularly the latter, are covered with a network of distribution lines which it is difficult for one not familiar with the country to conceive.

This condition is reflected quite clearly in the statistical data for our industry such as that published in the January issues of the *Electrical World*. These figures show that for the entire United States approximately 70 per cent of the total population live in electrically lighted homes while for the Pacific Coast as a unit, on the order of 90 per cent of the total population live in homes provided with electric service.

Perhaps the reason for this differential of 20 per cent lies in the fact that the electric utilities of the West were pioneers much in the same sense that the railroads of the West were pioneers. In the early days lines were extended into virgin territory when the only business in sight was the hope of that which would be there some day in the future. It was such courage and vision that built the West and so well has it been done that it is now difficult indeed to find arable land that is beyond practical reach of electric service.

Our problem is not how to build a distribution system at a lesser cost but how to live with and make additions to what we have and do it at a lower cost than at present.

Service Reliability

Coincident with the building up process has come naturally an increased system capacity, a greater demand for reliability of service together with many refinements in the art of distribution, additional safety features and the establishment of restrictive laws and codes on construction methods.

What has been the effect of these results of growth on our costs of distribution? Has an increased system capacity rendered obsolete or inadequate our ideas as well as our equipment for distribution substations and lines, or is it possible to continue economically with existing methods and equipment and what will be the effect on reliability of service?

In giving consideration to service reliability we are faced with one of the most complex factors of the entire problem because of its far-reaching possibilities and its effect on costs. It may be that in recent years too much stress has been placed on this phase of the subject. Perhaps our pride has overbalanced our judgment and has been the cause of spending considerable money to provide duplicate lines, automatic switching or other means of safeguarding our consumers' service, when as a matter of fact neither the record of outages nor the consumers' processes could possibly justify the expense. Or, it may be that through our own zeal in safeguarding service, we have built up in the minds of our consumers the thought that we don't believe in the reliability of our system ourselves and he accordingly makes unwarranted demands for service.

Whichever may be the case, it is absolutely necessary that a value be placed on these safeguards through a complete analysis of outage records. What is the cost of such reliability and how does this cost compare with the compare with the cost of outage?

Perhaps the reliability can be improved without duplication of lines and equipment. What are the possibilities for modification in routes for lines, cleaning or changing of insulators for others having greater reliability, raising or spreading of conductors to provide greater clearance from obstacles and each other? How do trees affect reliability of service from overhead lines and do restrictions of state or local governments on tree trimming tend to increase distribution costs. What is the answer to these problems? Does it mean that we must bend all our efforts toward a cheaper underground construction or can costs of existing systems be reduced without sacrifice of service. Certainly the final word has not yet been said on the simplification of overhead distribution.

Unfortunately the laws of some of our Pacific Coast States, notably California, are such that we cannot reduce our distribution lines to bare fundamentals as has been done in some parts of the country in an effort to slash costs. We cannot, for example, make use of 300-ft. or 400-ft. spans on 30-ft. poles because of the ground clearances imposed, nor can transformers and vertical secondaries be installed in the same amount of pole space because of the greater clearance required.

If these avenues to economy are closed to us, in what way can construction be simplified?

Poles

In the first place the grade of pole being used should be subjected to close scrutiny. If one grade of pole is being used for all classes of construction, it is apparent that a better grade of pole is being used on light construction than necessary. Such being the case, are economies to be effected through the use of different grades of poles for the different classes of construction, giving consideration of course to the costs of storage, handling, and selection of poles for each job?

The quality of poles used should also be given serious consideration. Perhaps a little lower quality product would effect appreciable savings. A few more knots, a little more curvature or a departure from a recognized taper should not prove to be insurmountable difficulties in construction.

Considerable experience has been obtained in recent years too, with pole treatments of various types. Poles in the early years of the industry were set without treatment of any kind. This practice was found unprofitable because of the relatively shorter life of that portion in the ground to the portion in the air. There then developed butt treatments of many types, culminating in the penetration method of hot creosote oil as being perhaps the best treatment for pole butts.

From this beginning the idea of pole treatment has grown until today there is a wide use of full length treated poles, which naturally are purchased at a premium over an equivalent butt-treated pole. The economies of the use of full length treated poles is therefore open to question. Full length treated poles may have a life greatly in excess of poles not so treated, but has operating experience shown that a pole life can be realized which will be commensurate with the increased cost?

Then there is the question of increased span lengths. Normally on urban lines span lengths are limited to an average of about 150 feet because of property subdivisions and telephone joint use. In suburban and rural territory however, property subdivision ceases to be of such great importance, although telephone joint use must still be considered in many cases. Where both power and communication lines are involved in suburban or rural areas, thus restricting span length, should each utility construct its own facilities or is there an economy to be realized through joint use of long span construction with interset poles for the communication circuits? Where no communication lines are involved what is the relative economy of minimum height poles with maximum spans to higher poles and correspondingly greater maximum spans?

Conductors

Types of conductors may have considerable bearing on the economy of long span construction. Are any savings to be made through the use of special conductors of higher strength than ordinary hard drawn copper?

Also, to what extent can the use of bare wire be carried? Bare wire has for years been in almost universal use on voltages of 10,000 and over and to some extent on lower voltages with entire satisfaction. Is there any reason why bare wire cannot be used for conductors of all voltages including secon-

daries and what would be the resulting effect on cost of tree trimming or possible special construction to clear trees or other obstacles? Is there any increased hazard to life, property, or equipment through the use of bare conductors and if so, what safeguards would be necessary and would the cost of any protective measures more than offset the savings?

Where crossarms are used to support conductors, perhaps many companies have followed the precedent established as "current good practice" and installed double arms where a single arm would have fully met all requirements. Or perhaps shorter arms of lesser cross-section could be used to advantage. Flat braces might be used in place of angle iron braces and fewer anchor guys used where span guys would be satisfactory. In other words, the smallest detail of overhead plant construction is worthy of the closest study, as any possible savings per unit will in the aggregate amount to very sizable proportions.

Planning

Adequate advance planning is another important feature in considering line extensions. A study of the area to be served, property subdivisions, street layout and relation of area to surrounding territory is a vital necessity if a well ordered and economical system is to result. But what is a practical means of accomplishing this result? Is long-time advance planning the answer, with a definite plan of action worked out for 5, 10, or 15 years in advance?

If this is the case, what provisions can be made for development and changes taking place within that period? We cannot, for example, lose sight of the fact that one of our greatest items of expense today is caused through the opening and widening of streets and the consequent moving of distribution lines. And so radical are these changes at times that two lines are required to serve the same business with the same revenue where but one line was necessary before.

We have all seen too, within a remarkable short period of time, a complete change from a suburban residential area to a thriving business district or even a heavy industrial section. Of course increase in revenue occurs coincident with such a change, but regardless of the ability of the increased revenue to justify capital expenditures, what provision can be made through judicious planning to provide the means for necessary expansion at a minimum of expense?

Distribution losses, defined as the difference in kilowatt-hours between the amount received at the distribution substation and the amount sold at consumers meters, is a matter that should be given considerable study. Practically every factor of system design will have a direct bearing on the character and magnitude of these losses, so that in giving consideration to any changes in design, the cost of distribution losses, or rather a reduction in the cost of distribution losses becomes one of our main objectives. Very little information is available on what should constitute maximum efficiency for a well designed system. Opinions will differ and of course service requirements will have considerable bearing on the subject, but a reduction below present costs and the best means of accomplishing that end is the problem confronting us.

In making a study of a given area, the results might indicate a more ideally suitable primary distribution voltage and a much better use of copper than is actually installed and in operation. But on a dollar and cents basis, considering all of the factors involved, can a change to this ideal voltage be justified? If not, it may be that an economically justifiable compromise can be worked out between the two, or perhaps a combination of two primary voltages into the same area would offer the best solution.

One of the foremost considerations involved in a change of primary voltage is the effect upon standarization of equipment and resultant effect upon costs. It is important therefore that the variety and type of equipment be kept at a minimum and it is highly desirable that any changes would tend toward a simplification of equipment rather than adding to it.

Substations

The economical size and location of substations will tie in very closely with any savings made possible through a better economic balance between feeder lengths and sizes. This particular phase of our question, however, is very difficult of solution when considering existing operating systems under present business conditions, but in those cases where expansion is necessary it offers perhaps one of the greatest single opportunities for savings of the entire problem.

Tremendous strides have been taken in the last few years in the development of equipment for system network operation of several types. A change to some one of these network systems could probably be shown to be economically feasible for many areas, particularly if extended over a sufficiently long period of years, although such a change may serve to increase costs in the intervening years. But in order to reduce costs are we justified at the present time in increasing costs for any period of years? Perhaps we are and perhaps we are not; the circumstances and conditions surrounding individual cases would probably be the governing factor. But what of modifications of one of these systems?

Perhaps the principle of placing small unit substations at several load centers without all the other features of a primary network could be used to advantage. Or possibly the use of low-voltage a.c. network transformers utilizing the four-wire system of secondary distribution would prove an economical solution.

There is also to be considered the further simplification of substation design, the use of tap changing transformers in place of induction regulators and the possibilities of closely knit, outdoor unit construction with a view to reducing the cost of land and buildings.

Voltage Regulation

Voltage regulation also is becoming of increasing importance in distribution costs. Since the advent of the electric refrigerator and other motor-driven appliances numerous difficulties have been encountered due to lamp flicker caused by motor starting currents. Ordinarily this condition is confined to the secondary system, and because of that fact, a multiplicity of applications of corrective measures are necessary. The cost of these correctives is a matter of great concern and there is some question as to the best and least costly means of controlling flicker.

Several methods of correcting this condition have been tried with some success, such as the cabling of secondaries, the use of auto transformers across the ends of secondary mains, the use of low impedance transformers and the installation of larger capacity distribution transformers. All these are costly, however, and perhaps no one of them represents the best economic solution.

In considering larger capacity distribution transformers, for example, which is in effect the installation of excess capacity, we are at once confronted with the marked tendency at present to load distribution transformers to 150 per cent or even 200 per cent of rated capacity during peak periods. The economy of this practice is perhaps subject to question as well, however, due to possible rapid sludging of the oil and resulting increased burnouts. This leads naturally then to the question of what is the economical

loading and spacing of transformers and a study of various load areas with respect to the diversity and load factors involved.

Of the various features entering into this problem, perhaps no one can be singled out as being of the greatest importance. Each one presents within itself the opportunity for much constructive thinking and a satisfactory solution of any one of them resulting in a reduction of present day distribution costs will be a distinct contribution to the industry.

Discussion

Variable Factors in Cost Reduction

By E. Y. PORTER
Southern Sierras Power Co.

THE title of the paper under discussion refers to lowering the *cost of distribution*, which does not necessarily mean lowering the cost of the distribution system, i.e., the physical plant. Most of the questions raised refer to the cost of elements of the physical plant, and this is not said as in any way criticizing Mr. Row's excellent presentation of the subject, but rather to call attention to the essential difference between the cost of physical plant and the over-all *cost of distribution*. This brings us to the fundamental question—do we really want to lower the cost of the distribution system, or, stated another way, will lowering the cost of the physical plant actually lower the cost of distribution? We have all had experience with systems or parts of systems of such low-grade construction that the upkeep and other operating costs were abnormally high.

There is just one other question, of a less general nature, which I would like to add to Mr. Row's already long list. I am wondering if some worthwhile economies could not be effected in fairly well developed urban areas by a simplified overhead secondary network, making use of some of the more recently developed transformer protective devices. You have probably all had your attention called to a line of transformers equipped with certain "built-in features", allegedly self-protected against lightning and surges and internal breakdown on the primary side, and against sustained overload on the secondary side. The primary is connected direct to the line without fuse cutouts. The secondary protection is by means of an internal, thermally-tripped circuit breaker, the thermal element of which depends for its action partly on the ampere output flowing through it and partly on the oil temperature, which is effected by the air temperature.

Would it not be feasible to couple the secondary circuits fed from such transformers through thermal circuit breakers located approximately midway between adjacent transformers and thus take advantage of (a) better regulation on the secondary system by reason of multiple sources of supply, (b) a reduced total transformer capacity by reason of greater load diversity on each unit, (c) greater continuity of service due to absence of primary fuses, and (d) relief from flicker, due to single-phase motor starting, through the balance coil effect of adjacent transformers.

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Basic Cost Figures Form Starting Point

By H. H. MINOR
San Joaquin Light & Power Corp.

WE ENGINEERS having to do with distribution system planning and operation are faced with a paradox. We must provide less costly facilities and at the same time preserve that high quality of service that is responsible in many instances for apparently high costs. We must not neglect proper maintenance of those facilities. Otherwise the useful life of the equipment will be lessened and future service jeopardized. The problem is one that requires engineering ability in its broadest sense.

The problem to be solved is more complex than might at first appear. It is not sufficient that simplified design, less costly equipment or the elimination of presumably duplicate features shall be considered alone. The effect of such changes on the net cost of service per kw.-hr. sold is the measure of advisability of such changes, restricted by their bearing on quality of service.

In the analysis of any costs there must be some basis from which to start. Present costs and cost trends must be known. Overheads consisting of interest, taxes, depreciation, etc., must be considered. Investment figures and expense charges for existing distribution systems are definitely known. Those figures can be divided into units or parts applying to particular classes of equipment, types of construction or, to more or less extent, to classes of load served. Such figures can be adjusted to present day price levels. They can be divided into costs per various units that best suit the purposes of the analysis.

Comparison of these figures during an elapsed period of time will reveal cost trends. Properly analyzed differences between total investment and loads served at one time and like investment and loads served at an earlier time will produce added investment as a function of added load. It is such figures as these that will serve as a basis of comparison of present and proposed costs of distribution and be most useful in solving the problem at hand.

These basic figures will vary for different systems and parts of systems. To break down these figures into costs per class of load or class of customers is only possible through a thorough cost of service study. For a large system serving various classes of service under varying conditions of load density it becomes an extremely involved problem. While such a study would be of great help in making a comparison of present and proposed practices in distribution systems, in order to arrive at a solution of the problem we are considering such refinement is not necessary.

Investment in the various subdivisions of the distribution system as a whole are available as are corresponding expense items. The following tables

Table I — Basic Distribution Costs

Distribution Investment

	Item	Total Investment	Pct.	Per Customer	Per Kw. Hr.	Per Dollar Revenue
1.	Distribution Substations	$ 3,800,000.00	12.7	44.19	.0076	.380
2.	Poles, Towers and Fixtures	7,400,000.00	24.7	86.05	.0148	.740
3.	Overhead Conductors	7,600,000.00	25.3	88.37	.0152	.760
4.	Distribution Transformers	8,250,000.00	27.5	95.93	.0165	.825
5.	Consumers Services	850,000.00	2.8	9.88	.0017	.085
6.	Consumers Meters	2,100,000.00	7.0	24.42	.0042	.210
	TOTAL	$30,000,000.00	100.0	348.84	.0600	3.000

Annual Distribution Expense (Operation and Maintenance)

	Item	Total Expense	Pct.	Per Customer	Per Kw. Hr.	Per Dollar Revenue
7.	Substation	$ 120,000.00	3.85	1.395	.000240	.0120
8.	Overhead Lines	138,000.00	4.43	1.605	.000276	.0138
9.	Dist. Transformers	87,000.00	2.79	1.012	.000174	.0087
10.	Services	13,000.00	.42	.151	.000026	.0013
11.	Meters	115,000.00	3.69	1.337	.000230	.0115
12.	Radio Interference	25,000.00	.80	.291	.000050	.0025
13.	Super. Misl. & General	60,000.00	1.93	.698	.000120	.0060
14.	Insp. Cons. Premises	35,000.00	1.12	.407	.000070	.0035
15.	Utilization Maintenance	22,000.00	.70	.256	.000044	.0022
16.	Depreciation	700,000.00	22.47	8.139	.001400	.0700
17.	Interest	1,800,000.00	57.80	20.930	.003600	.1800
	TOTAL	$ 3,115,000.00	100.00	36.221	.006230	.3115

present such basic distribution costs for one system. While they may not be in conformity with like costs for another system they are presented here to illustrate the value of such figures in arriving at the solution of the problem. These costs have been reduced to units per customer, per kw.-hr. sold and per dollar of revenue.

The figures in the investment table represent fixed capital chargeable to the distribution system. The depreciation annuity and interest—items 16 and 17—in the expense table refer to that capital. The other expense items are yearly expenditures for operation and maintenance for the distribution system covered by the investment shown.

As Mr. Row pointed out, the problem before us has to do largely with added facilities to serve added load rather than the building of an entirely new distribution system. Thus, instead of distribution investment as shown in the first table, unit costs of added investment per consumer, per kw.-hr. or per kw. of connected load would be of more value. Such a table would in a measure bring into the picture the fact that unit distribution costs should decrease normally as load density increases. It is the idea of this problem to present measures that will directly result in decreased distribution costs in addition to such reductions that may result from increased load density or other normal causes.

In arriving at a solution of this problem those items that represent the greatest investment or the greatest expense will naturally be the first to be considered. For instance it is seen that items 2, 3, and 4 of the investment figures in the tabulation cover more than 75 per cent of the total. It is also noticeable that items 16 and 17—depreciation and interest charges are some 80 per cent of the total expense.

Reduction in capital will reduce item 17—interest—in direct proportion to its reduction. Lessened capital may reduce depreciation provided that it does not entail the use of equipment whose service life will be less than the costlier equipment. Reduction in capital may increase the expense items covering the facilities installed due to increased maintenance of that less costly equipment.

As an example of this, if we assume that shorter poles are decided upon and therefore ground clearances lessened, tree trimming expense may be increased. Also hazardous conditions may result that will, as time goes on, prove very costly. Thus the saving in investment may not reduce the cost per kw-hr. sold.

Again, referring to the tabulations it is seen that while the investment in distribution transformers is the largest single item of investment, the corresponding expense item is comparatively small. Thus it might be found that a reduction in capital for that item would be advisable although item 9, transformer expense, were increased.

Scanning the expense items it is noticed that substations, overhead lines and meters show the greatest expenditures exclusive of items 16 and 17. Will greater economy result, in the case of any of these items, by making reductions in capital if it increases an already high expense; or by devising means of reducing the expense items even though capital will not be lowered?

Other examples of the use of such basic figures in solving the problem could be given. The tables themselves could be expanded to show more detail. The point that it is desired to make is that the whole picture must be scanned in proposing any change and that some such table of basic figures will be a great help in so doing.

The above discussion and examples have to do with actual figures. Such individual problems can be analyzed and results predicted with more or less exactitude. We may estimate high or low as to such items as probable maintenance charges or life expectancy of equipment considered, but long experience with such considerations will keep us somewhere near the probable figure.

There is the other side of the paradox though that is not so simple. There we have an intangible condition to face. Will the changes in facilities, in design or in maintenance methods or operating procedure result in poor service? How far can we go and still maintain the kind of service of which we like to boast and which we believe is essential if we maintain the good will of our consumers?

It is true that we can theoretically evaluate the cost of interruptions to service in terms of kw.-hr. unsold. But can we evaluate the cost in dollars to our customers whose service is interrupted or the cost to us of the loss of a booster, even though he does not become a knocker?

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Determine Appliance Load Characteristics

By J. S. MOULTON
Pacific Gas & Electric Co.

THE problems bring up the need for the engineer in utility operation. In talking the other day with our Mr. Crawford, Sales Manager, he said: "We can tell the management how many water heaters, how many ranges, air heaters, and how many of this, that, and the other gadget we can sell under conditions of rates with fair accuracy. We cannot tell the management which of these appliances we should try to sell. Only the engineer through his investigation can tell which of those appliances will be most profitable for the utility once it is on the line."

As to the two papers, I want to speak of them jointly, they bring out in their solution the need of a great deal of information which is not now available.

Rate making has been spoken of as being an art, not a science. The lack of information has helped in that view. We do know the load characteristics on different types of feeders. We do know with some accuracy the load characteristics of different classes of consumers as a group. We know a little bit about the characteristics of ranges and water heaters. We do not know nearly enough about the characteristics of individual appliances operated individually, or in the increasing diversity as they are operated together. We could get up a good argument anytime we get two engineers together as to the need or advantage of a double throw switch or load limiting device or water heater.

The operating engineer in his day-to-day contact has before him the opportunity of throwing a great deal of light on that kind of information. I should like to urge, from the standpoint of rate making in the solution of these problems, that more information be obtained as to the characteristics of particular types of load and the relative profitableness of appliances.

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Room For Savings In Construction Costs

By HERBERT KNOPF
Pacific Gas & Electric Co.

THERE are many factors in pole line construction which enter into the problem. General Order No. 64 specifies a definite minimum of standard to be met in the heights of pole, tree-trimming, etc. Do we too often use better equipment, such as cutouts, insulators, poles, and pins, than is justified by the type of service for which the line is built? For instance, the butts of transmission poles must be painted to make them visible. Is this a needless expense when the pole is out of sight of the highway? Is it necessary to use steel pins, bonded to ground, on 11-kv. lines?

Estimating costs are high due to the complicated accounting procedure. The red-tape involved in obtaining state and local permits for construction raises costs. Right of way acquisition brings up the expense. All of these things lead me to believe that there is lots of room to reduce our costs in overhead construction.

Reduce Increment Costs For Maximum Savings

By C. C. MATTSON
Los Angeles Gas and Electric Corp.

IS NOT the common primary and secondary grounded neutral system well suited for combination with existing systems? In the application of this system is it always necessary that an entire substation area be changed to the common neutral system? Why shouldn't this system be used for only one primary circuit fed from a given substation or even a portion of a circuit if it has an economic advantage over the existing system?

A distribution system must of necessity cover a wide area and the lines will follow streets and highways, which are also used by the public. In the routing of these lines, in the type of construction used, in our efforts to reduce costs, are we keeping in mind the safety of the public? A saving of a few dollars each on many jobs may be completely wiped out by the cost of one accident. To what extent should protective devices or protective measures be employed to prevent the possibility of high voltage entering or damaging consumers' premises or apparatus?

When facilities are being planned or installed to serve a load which will be an excellent revenue producer, it quite often happens that some refinement is included that is entirely justified by the revenue to be derived from that particular installation. But do we stop there? Is there not a tendency to make "standard practice" of these refinements regardless of their economic justification?

A large proportion of the cost of building an overhead distribution circuit is chargeable to guying. The larger proportion of this guying cost, estimated as being aproximately 75 per cent of the total, is expended in guying the secondaries only. It is not at all an unusual condition for the cost of guying a short secondary extension to amount to over 50 per cent of the total cost of the extension. Yet a secondary extension is considered of minor importance, particularly the guying. But since the guying represents such a large proportion of the total cost of the secondaries, is it not logical to believe that here is a place to concentrate our attention with excellent prospects of effecting worthwhile savings?

We know that the electrical load on a three-wire secondary system cannot be kept balanced at all times and that as the load shifts from one "hot leg" to the other the neutral shifts, which increases the voltage variation. Since the days of the first central station it has been considered "good practice" to install a neutral smaller in size than the "hot legs". But is this good practice today? The load of today is radically different from that of fifty years ago. Shouldn't the neutral, for present day loads, be as large as the "hot legs" and even in some cases larger?

For example, when a new real estate tract is opened, a small conductor three-wire secondary system is all that is justified. At some later time the load will increase to the point where larger conductors are necessary. But a large proportion of the cost of replacing small copper with a larger size is expended in cutting over services to the new conductors. If all the services are of the three-wire type, 33-1/3 per cent of the cost of cutting over the services will be expended in cutting over service neutrals. If all the services are of the two-wire type, 50 per cent of the cost of cutting over these services will be expended in cutting over neutrals. Therefore, the cost of cutting over service neutrals lies between these limits and keeping this fact in mind would it be economical to install a large neutral at the time the tract is pre-empted?

Would, say a No. 1 neutral be large enough for "hot legs" from No. 4 to 2/0 in size? Is not the secondary current unbalance proportionately larger with the smaller loads, i.e. when only small size copper is required, than on the larger loads? The unbalance on a No. 4 secondary may be 20 amp. but on a No. 2/0 secondary we can keep this balance to less than 40 amp. We have more than tripled the area of our copper but the current unbalance has only doubled. Does it not appear logical that a large neutral installed at the time a tract is pre-empted will be the least costly eventually?

In the past, one of the objections to the "banking" or paralleling of transformers was the fact the fuse might blow on one transformer and this condition would not be known for some time, resulting in low voltage and possibly an interruption to service as the inspector, on his periodical inspection, might pull the fuse on the energized transformer first. But this operating difficulty can now be overcome by the use of the drop out type of primary cutout. With this thought in mind, is not the banking of transformers preferable in some cases to the changing of secondary copper?

The radio has helped to increase our revenue but it has also increased our distribution expense. The suppression of radio interference is one of the factors that has raised the cost of distribution. What measures can we employ to reduce radio interference that are less costly than the methods we use at present?

New problems arise as new appliances are added to the distribution lines; the radio introduced the interference problem, the electric refrigerator the various serious secondary voltage regulation problem, neon signs are lowering our power factors. So year by year the distribution problem becomes more complex. And year by year the cost of distribution has increased. This cost has increased by increments, but since no single item of a distribution system may be singled out as of paramount importance, will not lower overall costs be attained by a lesser cost, where ever possible, of the component parts which make up the system as a whole?

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Cut Consumers' Distribution Costs

By P. B. GARRETT
Westinghouse Electric & Manufacturing Co.

WHY should this study stop at the consumer's entrance switch? The problem of distribution cost on the consumer's premises is of vital importance to the utility, for it is the final bottleneck which must be overcome in bringing about maximum use of electrical energy. The delivery of power to the consumer's premises at a cost which should automatically rule out other forms of power, from the standpoint of delivered cost alone, will still fall short of the goal if some way is not found to lower the cost to the consumer of providing the final link between the service entrance switch and each energy-consuming device.

Particular thought should be given to the problem of the cost to the consumer of revamping distribution facilities within existing homes to facilitate and encourage the addition of major energy-consuming devices.

The simplification of domestic distribution and reduction of the consumer cost would greatly stimulate the use of electrical energy, which in turn would automatically reduce the distribution costs to the utility by increasing distribution load factor.

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Is Perfection Worth the Price Paid?

By J. O. TOBEY
Pacific Gas & Electric Co.

APPARENTLY we in the electrical industry have, in keeping with the modern practices of other professions, endeavored to reach a high ideal or perfection itself in many things such as efficiencies, strength of materials, ac-

counting procedure, voltage regulation, safety work and reliability of service. The closer to perfection in any or all of these things, the greater is the cost. In all of these a line must be drawn to divide economic practicability and perfection.

Falling into this category are the now standardized requirements imposed by super-critical consumers who, regardless of good service given, demand better; the rules imposed by regulatory or civic bodies, perhaps politically controlled; the opinions of some engineer who has developed some device or gadget which may or may not have merit, but being his own brain-child it becomes "standard." All of these cost dollars. Are they worth their price?

In our enthusiastic zeal to prevent accidents, measures have been adopted to prevent the recurrence of an accident that only happens once. Yet its anticipated recurrence involves a perpetual operating expense.

Our aesthetic senses have frequently overbalanced good judgment. Is the aesthetic worth its price? In many instances the line dividing perfection and practicability is drawn too high.

Is Good Voltage Regulation Necessary and Practical?

By L. A. BUESE
Electrical Protection Engineer, Los Angeles Gas and Electric Corp.
and
FRANK A. AYRES
The Southern Sierras Power Co.

REALIZING that the problem of voltage control is a very broad subject and that space limitations may prohibit a comprehensive answer to the whole problem, we will endeavor to present a set of smaller problems all related to the main subject. The "best paper" may come as an answer to the main problem or any part of it. An answer may be submitted on the cause, or the effect, or the remedy of any part of the problem. Some of the parts may require a technical answer—others a non-technical one.

The importance of proper voltage to both the consumer and to the utility cannot be denied. The fact that the majority of electric customers are users of resistance-type devices, such as lamps and heating equipment, and that proper voltage is necessary for the satisfactory operation of this type of apparatus makes the greater part of our customers voltage conscious.

Does this "voltage consciousness" have anything to do with the public's opinion of the utility? Is there any relation between voltage regulation and customer good-will? How many of our complaints may be laid to improper voltage? It is possible that the money spent for correction of complaints may return surprising dividends of good-will. It is possible that this method of obtaining good-will would compare favorably with results obtained by other methods.

From the view point of the utility, good will is essential, but so is revenue. Is there any relation between voltage regulation and revenue? What part of our revenue is affected by variation in voltage? Can revenue alone justify the correction of improper voltages?

Not all of the electricity generated by the utility reaches its customers. From 10 to 25 per cent may be absorbed in so-called "losses". What relation is there between voltage regulation and losses? Does improper regulation add to these losses and, if so, to what extent? Can a valuation be placed on that part of the losses due to variation of voltages from normal?

The terms "proper" and "improper" voltages are being used in this paper. Let us stop a moment and decide just what we mean by these terms. Let us set up a few yard-sticks. Since we are to have so many big ones in the industry, a few additional smaller ones will scarcely be noticed.

The Problem:
How Important Is Voltage Regulation? What Are the Most Practical and Economical Methods of Accomplishing It?

Just what do we mean by "proper regulation of voltage"? Is the standard for a residential customer different than that of a commercial, or an industrial or a rural customer?

If 115-volt lamps and appliances are standard, should 115 be the minimum, maximum, or average voltage? Shall we specify that the average customer shall receive, say a minimum of 113 volts and a maximum of 118 volts, or should we specify that no customer shall receive less than 113 volts, nor more than 118 volts? Maybe the figures of 113 and 118 are all wrong and that no customer should receive less than 115 volts.

Where and how shall we measure this voltage? Is 115 volts at the lamp correct or is 118 volts at the main switch correct? Or is the voltage at the center of distribution a sufficient indication of conditions at the consumers lamps? Unsatisfactory voltage conditions may arise due to the unbalanced condition of loads on circuits. This unbalancing may be on single-phase 3-wire circuits, three-phase 3-wire, or three-phase 4-wire circuits and on primary or secondary circuits. It may be caused by customers' apparatus, or by the non-balanced condition of services or transformers. Should these conditions be overlooked unless a customer complaint is received or should the utility make periodic checks to determine if these conditions exist?

If checks are made, what should they consist of? "Load checks", or "voltage checks"? Is it practical and economical to use routine voltage checks to discover these conditions and eliminate complaints? When a circuit is once balanced, is it practical to keep it balanced by means of records or should observation in the field be relied upon for future connections?

Are the large commercial users entitled to closer regulation? He probably has advice from engineers and lamp manufacturers who are familiar with lighting costs. The industrial customers with fluctuating motor loads are less sensitive to voltage variation but there must be some limit to this variation. The rural customer can be given regulation comparable to his city cousin, but is the cost prohibitive? Is it necessary? If it is not necessary for him,

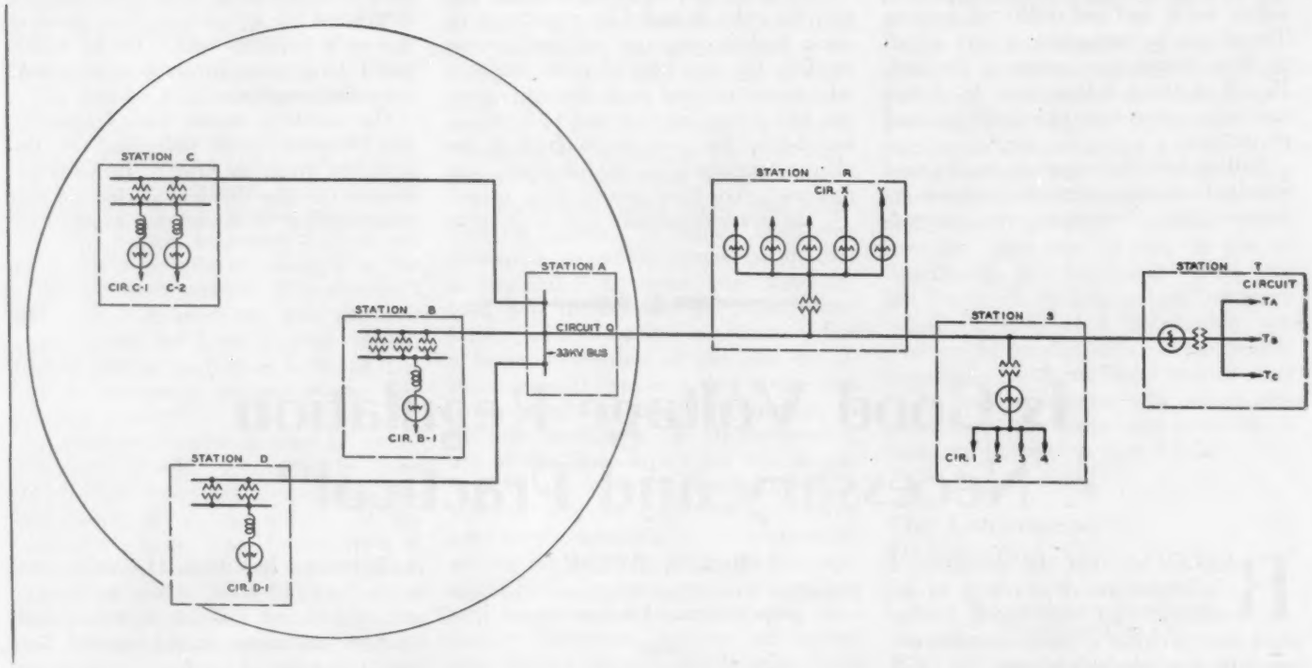


Fig. 1 — Diagram of section of hypothetical system

why is it necessary for the more numerous city dwellers?

Gradual shifts in voltage may not be objectionable, but sudden changes in voltage may cause many complaints. How much and how rapidly may changes be made in voltage without being noticeable or objectionable? Some domestic type refrigerators have comparatively large starting currents and cause momentary flickers. Should a limit be placed on the extent and duration of this type of trouble or should it be ignored entirely? Others may cause a continuous pumping effect. Should a limit be placed on them?

Many other devices of a compressor type, such as gasoline station air pumps and drug store refrigerators also cause this condition. Should they be connected to ordinary lighting circuits?

Many of the causes of poor voltage regulation are due to conditions existing in the utilities lines and apparatus. Should we plan something different for new installations? Is it practical and economical to change or rebuild present unsatisfactory conditions?

Let us present some actual physical setups as they exist today and see if anything can be done to remedy unsatisfactory voltage conditions, if they exist. As these conditions need a background we will supply one.

Fig. 1 represents a typical system. To the north is a city of 500,000 population. Its area is roughly the shape of a circle, with a diameter of twelve miles. The main business district is in the center of the city; the residential section extends to the north, east and west sections of the city, while the railroads and industrial area occupy the southern section. To the south and east of the city extends a typical rural area with its small communities scattered here and there. In order to place a limit on the problems let us eliminate the generation and main transmission facilities and start at a receiving substation. This receiving substation is located in the industrial section of the city and from it run the sub-transmission lines to the city distribution substations and to the surrounding rural areas. Only that part of the system which is concerned with the problems in question are shown. Emergency lines etc., are not shown.

These sub-transmission lines have a rating of 33-kv. and 60 cycles and Fig. 2 shows a typical voltage curve for the 33-kv. bus at the receiving substation marked "A". You will notice that the voltage is varied throughout the day to compensate for sub-transmission line voltage drop. Throughout the city are located distribution substations fed by these sub-transmission lines. The transformers located in these city substations are rated 32,700/2,400 volts with four 2½ per cent taps below normal on the high voltage side. There impedance is approximately 7.75 per cent with a voltage regulation of 1 per cent on 1.0 P.F. and 5.5 per cent on 0.8 P.F.

The induction feeder voltage regulators are rated 250 amp., 2,400 volts, 10 per cent buck or boost. Two regulators are used on 2,400-volt circuits and three regulators on 4,150-volt circuits.

Turn your attention to the distribution substation marked "B". It is fed by a 33-kv. sub-transmission line 14,100 ft. long. The conductor is a 350,000 cir. mil 3-conductor underground cable.

There are three transformer banks, 5,000, 5,000 and 7,500-kva. capacity, connected delta-delta to a 2,400-volt bus. A typical station "B" daily load curve is shown in Fig. 3.

The power factor at 4 a.m. is 0.6 and at 11 a.m. it is 0.82.

From Station "B" there is a 2,400-volt circuit called circuit B-1. The circuit has a 300-amp., 5 per cent current limiting reactor. It feeds through a 350,000 cir. mil 3-conductor 5,000-volt underground cable into a business district with buildings ranging from 2 floors to 12 floors in height. Fig. 4 is a map showing the general location of circuit apparatus and a typical daily load curve is shown in Fig. 5. It is 6,300 ft. from the substation to vault No. 1. The other distances are as shown. The building substation has in it, three 200-kva. transformers for supplying light and three 150-kva. transformers for power. These transformers have a regulation of 1.3 per cent at 1.0 P.F. and 3.2 per cent at 0.8 P.F. All of the other transformers on this circuit are subway type and have a regu-

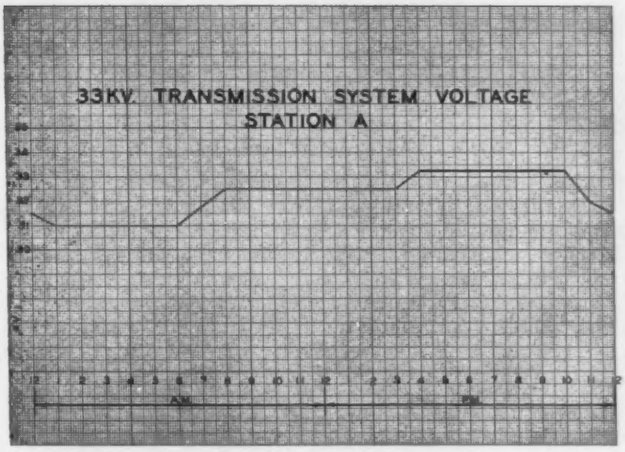


Fig. 2—Voltage diagram for receiving Station "A"

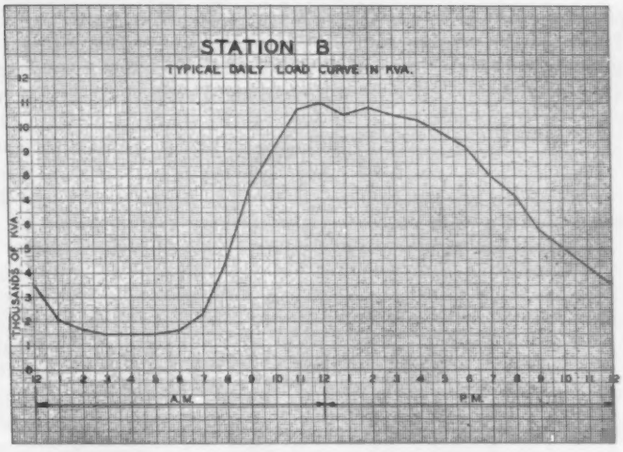


Fig. 3—Typical daily load curve for Station "B"

lation of 1.5 per cent at 1.0 P.F. and 4.5 per cent at 0.8 P.F.

The street vaults supply light and three-phase 220-volt power to street secondaries and also have transformers which supply single buildings. Transformers are located as follows:

Street Vault No. 1.
1—100-kva. Lighting secondary.
3— 25-kva. Power secondary.
Street Vault No. 2.
1—100-kva. Lighting secondary.
3— 50-kva. Power secondary.
1—100-kva. Single building lighting.
Street Vault No. 3.
1—100-kva. Lighting secondary.
1—100-kva. Single building lighting.
Street Vault No. 4.
1—100-kva. Lighting secondary.
3— 75-kva. Power secondary.
1—200-kva. Single building feed.

Lighting secondaries consist of two 500,000 cir. mil single-conductor cables and one 4/0 weatherproof wire for the neutral. Services from street secondaries are from 75 to 200 ft. long and in general consist of No. 2/0, No. 0 and No. 1 wire. A typical lighting secondary is shown.

Some of the customers on single building feeds, especially those fed from the building substation, complain of high voltage. An investigation reveals that, due to the depression and receivership difficulties, one of these larger buildings is only partially occupied and that the transformers, services and building wires are less than 20 per cent loaded. The voltage is about 5 volts above normal. The check also shows that some of the customers taking light service from the street secondaries, in blocks of 20 to 25 kva. and on services 200 ft. long, are receiving slightly below normal voltage. What shall be done? Goodwill of the larger customers, satisfactory service to many smaller customers and revenue all enter the picture.

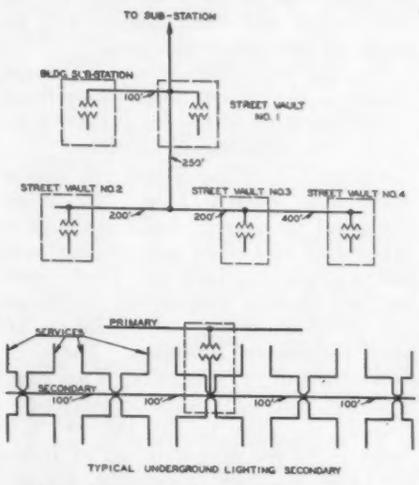


Fig. 4—Typical d'agram for circuit B-1

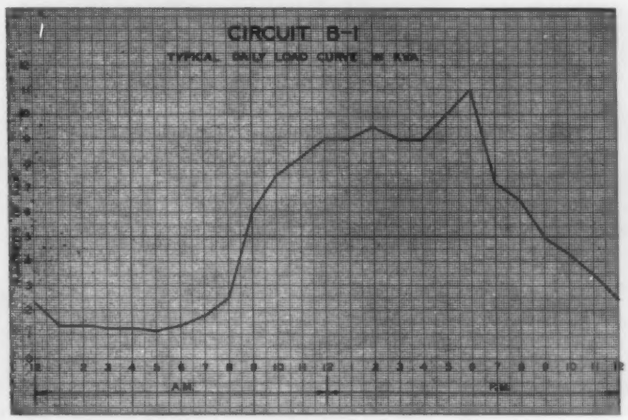
Substations C and D are located in the residential area and are fed by overhead sub-transmission lines with conductors of 350,000 cir. mil copper on a 4-ft. vertical spacing. The line to Station "C" is 43,000 ft. long; the line to Station "D" is 37,000 ft. long.

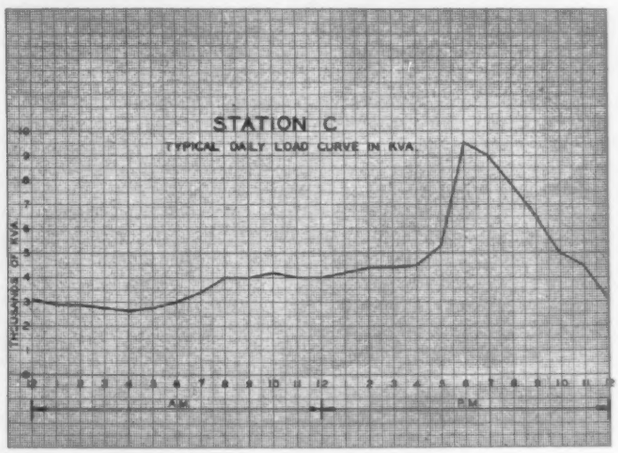
Station "C" has two transformer banks of 5,000 kva. each and a typical daily load curve is shown in Fig. 6. Power factor at 4:00 a.m. is 0.6; at 11:00 a.m., it is 0.75 and at the time of the peak is 0.9.

Three distribution circuits have been shown from these stations. These circuits are 4,150 volts, 3-phase, 4-wire. Main conductors from station to load centers are three 4/0 and 2/0 neutral. Main lateral conductors are in general of No. 1 wire and sub-lateral conduc-

Fig. 6—Typical daily load curve for Station "C"

Fig. 5—Typical daily load curve for circuit B-1





tors are No. 6 wire. The spacing is 12 in. with a neutral in the pole position. Distribution transformers have a ratio of 2,400/240/120 volts and the regulation runs from a 10 kva. with 1.75 per cent at 1.0 P.F. and 2.3 per cent at 0.8 P.F. to a 37.5-kva. transformer with 1.5 per cent at 1.0 P.F. and 2.5 per cent at 0.8 P.F. Where re-

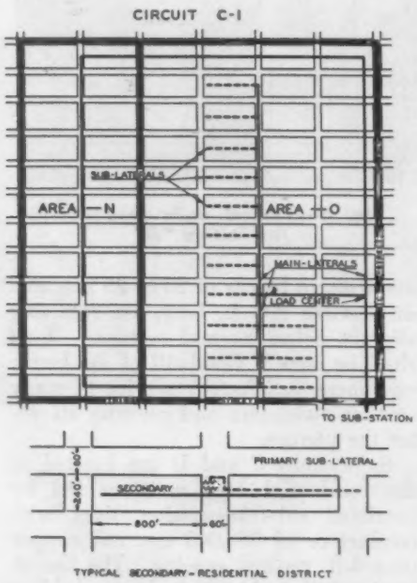


Fig. 7—Map of area served by circuit C-1

actors are used they are rated 300 amp. at 3 per cent. The power factor of these circuits is 0.6 at 4:00 a.m., 0.75 at 11:00 a.m. and 0.95 at time of peak load. A map and typical daily load curve are shown for each circuit in Figs. 7, 8, 9 and 10.

Circuit C-1 supplies a district made up of two areas. Area "N" is 70 per cent built up with single family residences on 50-ft. lots. Area "O" is 60

Fig. 8—Typical daily load curve for circuit C-1

per cent built up with four and six family flat buildings on 50-ft. lots. Area "N" has a demand for lighting of 400 watts per service while Area "O" has a lighting demand of 1,250 watts per service. In addition there are only five electric ranges in the district, but the refrigerator saturation is 75 per cent.

The main feed from the substation is 6,500 ft. long. The entire district was originally built with No. 4 secondaries. In Area "O" due to the character of the load, some of the secondaries have been enlarged. Transformer sizes are 10 and 15 kva. in Area "N" and 15, 25 and 37.5 kva. in Area "O".

Area "O" shows signs of building activity and it is estimated that within three years an additional 15 per cent of the area will be built up and that 40 new ranges and water heaters will be scattered throughout the area.

Voltage regulation is causing some trouble at the present time. Under these conditions what is the logical development of the distribution facilities?

Circuit C-2 (Figs. 9 and 10) has a main feeder 9,400 ft. long. "C" Street has small commercial buildings with a demand of 150 watts per running foot and is 70 per cent built up. First Street has two 10-story commercial buildings and about a 20 per cent build-up of small commercial buildings. The area to the right of "C" Street is 75 per cent built up with 300 watt demand residences; the area to the left of "C" Street is 35 per cent built up of four-five and six-story apartment houses with a 3-kva. average demand. There are no alleys. All of the facilities are either on streets or property lines. In this area secondaries are either No. 4/0 or 2/0 with transformers ranging in size from 25 to 75 kva. Adjoining circuits have no spare capacity but do have satisfactory voltage conditions.

Voltage conditions in the area shown are very unsatisfactory. What should be done?

Station "D" serves a somewhat different district. It has small industrial plants but to a large extent, the load comes from the five or six-room homes of working people. A typical load curve for station "D" is shown in Fig. 11.

Circuit D-1 feeds a typical residential area. Fourth Street and "D" Street are 30 per cent built up with small com-

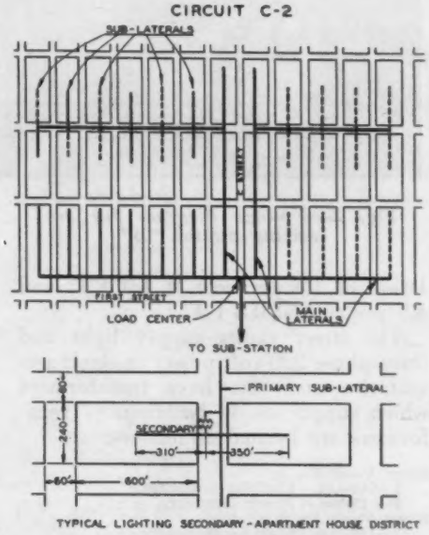
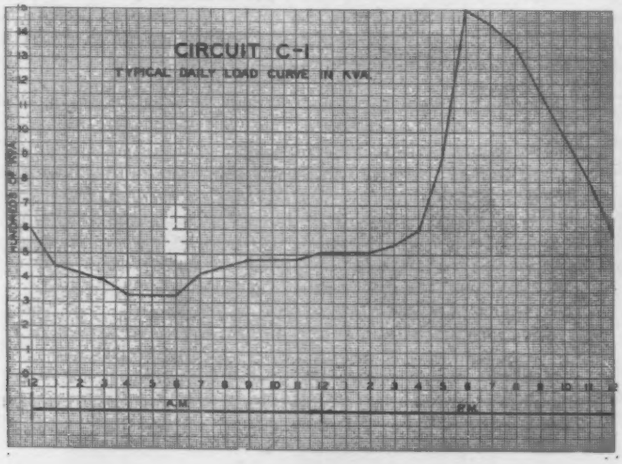


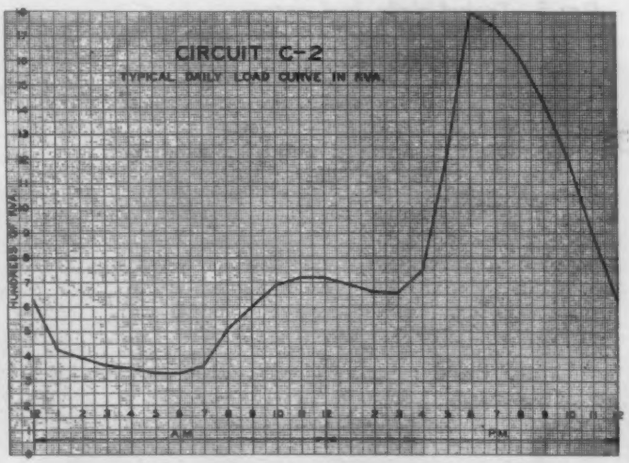
Fig. 9—Map of area served by circuit C-2

mercial buildings with a demand of 25 watts per running foot of buildings. The balance of the area is about 70 per cent built up with five and six-room houses with a lighting demand of 200 watts. The main feeder is 7,500 ft. long and when the area was subdivided twenty years ago, was built with No. 4 secondaries. A typical transformer and secondary is shown in Fig. 12. The lots are 40 ft. wide.

Transformer sizes are 10 and 15 kva. Fig. 13 is a typical daily load curve.

Fig. 10—Typical daily load curve for circuit C-2





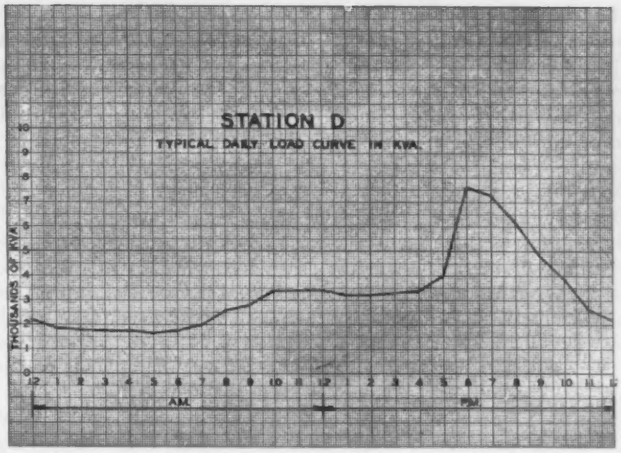


Fig. 11—Typical daily load curve for Station "D"

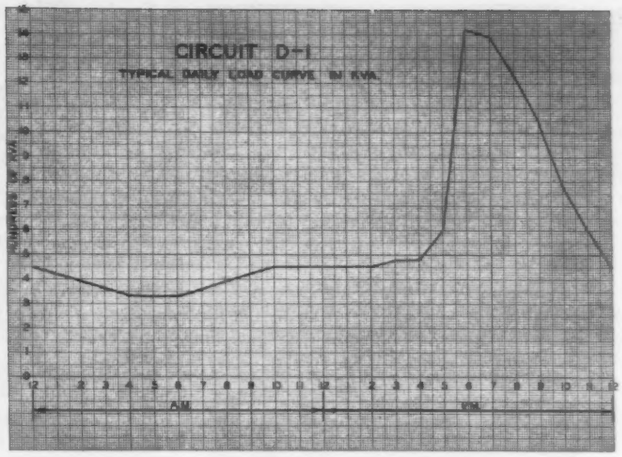


Fig. 13—Typical daily load curve for circuit D-1

The installation of ranges, water heaters and refrigerators is causing some voltage complaints. When a range or water heater is installed especially near the end of a secondary, the question arises as to the advisability of extending primaries and installing separate transformers for the range or to extend primaries in both directions, install two

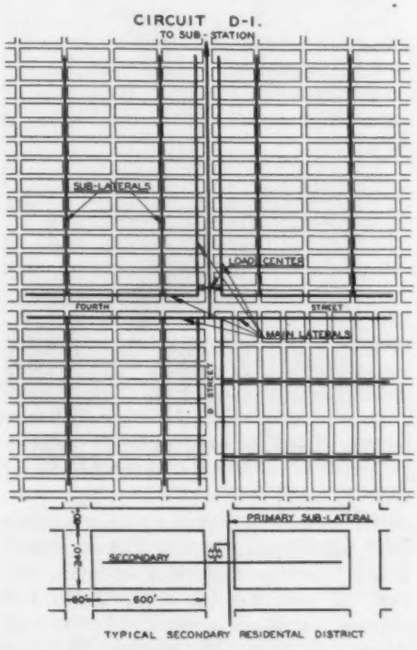


Fig. 12—Map of area served by circuit D-1

transformers, split the secondaries and put the range load on one secondary, with the lighting.

The advisability of banking transformers also arises and appears to offer a very nice solution.

DATA PERTAINING TO CIRCUIT "Q"

Station "A"—Circuit "Q" is fed from the main 33,000-volt bus at Station "A". The voltage on this bus is regulated throughout the day in accordance with chart "A".

Station "R"—The line from Station "A" to Station "R" consists of No. 2/0 copper having a 3-phase flat configuration with a 3-ft. spacing between each outside and center conductor. The distance from Station "A" to Station "R" is fifteen miles.

Station "R" serves a small city of 7,000 population. The main station transformer bank consists of three 750-kva. transformers connected delta-delta and 32,700/2,300-volt ratio. Voltage taps available are 32,700, 31,900, 31,100 and 30,300 primary and 2,400, 2,300 and 2,200 secondary. The regulation of these transformers is 1.1 per cent at unity P.F. and 4.3 per cent at 0.8 P.F.

There are five 2,300-volt feeder circuits, each equipped with a 3-phase induction regulator having 10 per cent boost and 10 per cent buck range. The total station daily and monthly load curves are given in Figs. 14 and 15 respectively. Due to seasonal load changes, Fig. 14 is expressed in percent rather than kilowatts. Any daily average kilowatt figure obtained from Fig. 15 is intended to apply directly to the percentage in Fig. 14 at its average point.

An unserved, residential district offering an immediate field of 15 customers, each averaging 4-kva. connected load is within 2,000 ft. of circuit "X" from one side and the same distance from circuit "Y" on the other side. Voltage charts "Rx" and "Ry" in Fig. 16 indicate typical daily curves for each circuit at the point where connection would be made to either to serve the new district. The charts indicate primary values obtained through 20/1 ratio potential transformers, "Rx" being for circuit "X" and "Ry" for circuit "Y".

Circuit "X" serves 12 customers of a strictly industrial nature, having a total connected load of 1,200 kva. with 15-min. maximum peaks of 600 kw. at 0.75 P.F. This circuit is relatively short and serves no residential customers. Instantaneous voltage fluctuations shown on the chart are caused by the starting of some of the larger motors.

Circuit "Y" serves residential, commercial and smaller industrial customers having a combined transformer rating of 1,000 kva. The peak load does not exceed 450 kva. This is a very extensive circuit of considerable length containing many branches.

Taking all factors into account, which of these two circuits should be used to supply the new district in order to provide it with the most suitable voltage regulation?

Station "S"—The line from Station "R" to Station "S" has the same spacing as from "A" to "R" but the conductor is No. 2 copper. The distance from Station "R" to Station "S" is 20 miles.

Station "S" serves a small community of 1,500 population and the outlying rural district immediately surrounding. The main station transformer bank consists of three 150-kva. transformers connected delta-delta and 32,700/2,400-volt ratio. Other voltage taps and regulation data are identical with transformers at Station "R". The main station 2,300-volt bus is regulated by two single phase induction regulators operating in open delta. There is no individual feeder circuit regulation. Bus regulators are 10 per cent buck or boost.

The circuit load characteristics are as follows:

No. 1—Strictly rural load only—no town distribution.

No. 2—Combined rural and town residential load.

No. 3—Town commercial, industrial and residential load.

No. 4—Residential town load only.

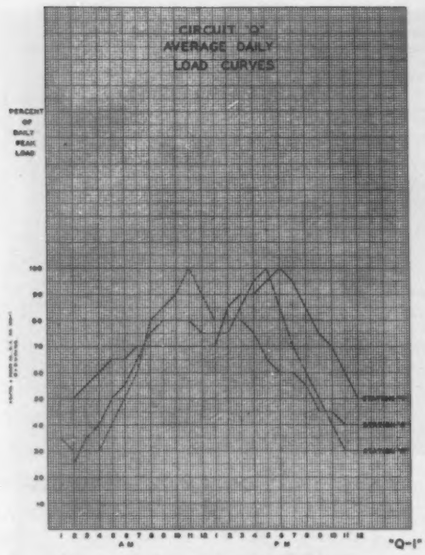


Fig. 14—Average daily load curves for circuit Q expressed in per cent of daily peak load

The rural load contains several pump motors, all of which are assumed to have approved starting compensators, none being of the "across the line" type.

For the purpose of this problem assume all distribution transformers to have 1.8 per cent regulation at unity P.F. and 2.8 per cent at 0.8 P.F. These transformers are of either 2,300/230-115 or 2,300/460-volt rating with no additional taps. It is assumed that the loads are as nearly balanced between phases as possible.

Figs. 14 and 15 indicate daily and monthly loads for Station "S" in exactly the same manner as described for Station "R". In addition, Fig. 17 indicates the division of the total station load between the four circuits throughout one typical day. This curve sheet indicates the individual circuit load expressed as a percentage of the total station load thus making it applicable for any season of the year.

Additional data applying to feeder circuits at Station "S" are shown in Table I.

Is the regulation as provided for these four circuits satisfactory in part or in whole? If not satisfactory is it all that can be justified economically? If better regulation is required what means should be taken to provide it?

Station "T"—The line from Station "S" to Station "T" has 3-ft. triangular spacing of conductors, consists of No. 6 copper and is twelve miles in length.

Station "T" serves a scattered rural district having no gas competition and containing several pump motors. The main station transformers are three 100-kva. units connected delta-star using normal 31,900/2,300-volt ratio. The regulation is the same as indicated for the Station "R" transformers. These transformers are equipped with automatic tap changing, underload equipment having four 2½ per cent steps above and four 2½ per cent steps below the normal ratio.

There are three 4-wire, 4-kv. circuits branching from this station, none of which have individual circuit regulation provided. On all circuits the pump motors are considered to be in use 75 per cent of the time from March to October inclusive but only 20 per cent of the time the other four months.

All primary and secondary distribution transformers are to be considered as having the same regulation data as given for Station "S".

All conductor spacing for both primary and secondary circuits is 12 in. with all conductors in the same horizontal plane.

The power factor of pump circuits is considered as 0.8 and of other circuits 0.9. For circuits "TA" and "TB" the maximum load is considered to be 0.8 of the connected transformer capacity of the entire circuit. For each individual customer the minimum loading is considered to be 1 kw. on these two circuits. As described for Station "R", Figs. 14 and 15 indicate the daily and monthly load curves for Station "T".

Some of the smaller pumps in this district are of the "line start" type but all the larger ones may be considered as having proper starting compensators.

The detail of each circuit is as follows:

Circuit "TA"—Primary 4-kv. circuit all No. 6 copper. At end of first mile, two banks of 10-kva. transformers in open star, each bank supplying one customer. One customer has one 10-hp. pump motor, 2 kw. light and 10 kw. heat. The other customer has one 15-hp. pump motor, 2 kw. light and 8 kw. heat load. No secondary runs other than services.

At end of third mile a bank of three 25-kva. transformers feeding a No. 1/0 copper, 3-phase secondary circuit extending 0.75 mile each direction on the same poles with the primary. Six customers are supplied, being approximately equally spaced along this secondary, the most distant being at the extreme end in each case. Each customer has a 10-kva., single-phase 2300/230-115 volt transformer for light and heat service. Assume all six loads approximately equal. Assume maximum demand of entire secondary circuit which also includes several small 3-phase motors, to be equal to the capacity of the three 25-kva. transformers.

At end of seventh mile, a bank of three 20-kva. transformers supplying one customer. Load consists of one 50-h.p. pump motor plus light and heat load supplied by a 10-kva. 440/230-115 volt transformer. No secondary circuit other than short service drop.

Circuit "TB"—Primary 4-kv circuit all No. 6 copper. In first mile three customers approximately equally spaced each averaging 10-kva., single-phase load, all supplied by one 25-kva., 2300/230-115 volt transformer at main station "T" over a No. 1/0, No. 2, No. 1/0 copper secondary circuit. Nearest customer 0.1 mile from station "T" and most distant 0.4 mile. Secondary on same poles with primary.

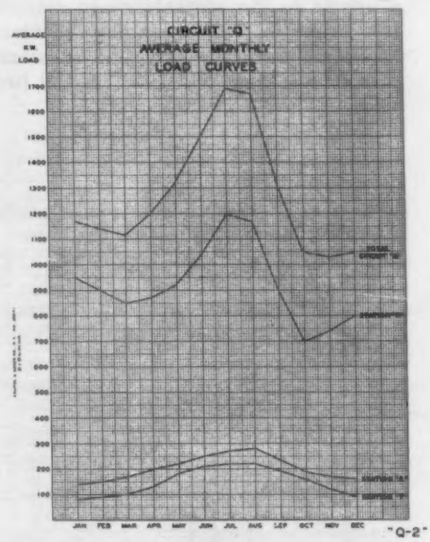


Fig. 15 — Average monthly load curves for circuit Q expressed in kw.

At center point of second mile one customer supplied by two 10-kva., 2300/230-115-volt transformers in open star. Load consists of one 15-hp. pump motor and 8-kw. light and heat.

In third and fourth miles, one customer in each mile, the same as described for the second mile.

At end of sixth mile, a bank of three 15-kva. transformers supplying two cus-

Table I — Data on Circuits at Station "S"

	No. 1	No. 2	No. 3	No. 4
Total connected transformer capacity (kva.)	110	240	400	280
Max. demand factor of total transf. capacity	0.7	0.5	0.4	0.3
Average circuit power factor	0.75	0.75	0.80	0.90
Impedance per wire to center of distribution (ohms)	3.0	2.8	1.1	1.8
Maximum load beyond center of distribution (kw.)	15	75	80	60
Impedance per wire beyond center of distribution (ohms)	4.8	6.2	2.9	3.7
Maximum load at extreme end of circuit (kw.)	6	25	35	8
Minimum load at extreme end of circuit (kw.)	1	3	8	2
Assumed maximum secondary voltage drop (%)	4.0	4.0	2.5	3.5

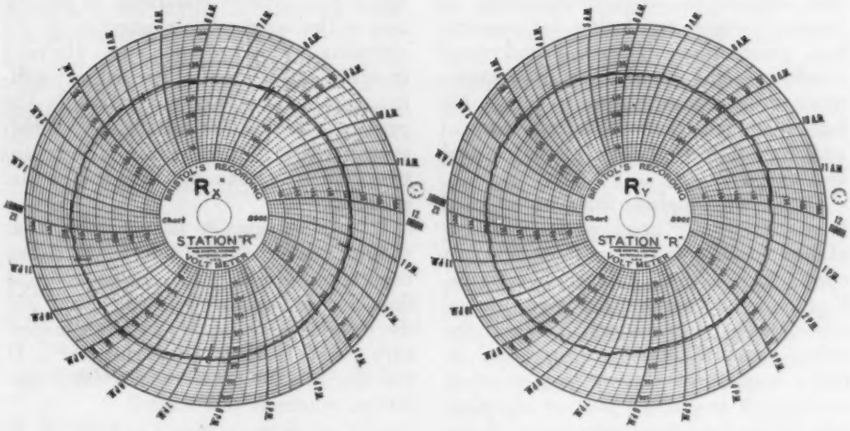


Fig. 16 — Typical daily voltage charts for circuits X and Y, Station "R"

tomers. The first customer located at the transformer bank location has a 25-hp. pump motor and 15-kw. of light and heat load including a 10-kw. incubator. The second customer one quarter mile beyond has 10-kw. total connected load supplied over a single phase No. 4, No. 6, No. 4 copper secondary.

Circuit "TC"—This is a 4-kv. circuit ten miles long of No. 4 copper having no intermediate loading. The only load is one 75-h.p. pump motor at the end of the line supplied by a 3-phase bank of three 25-kva. transformers.

The conclusions obtained for Station "T" should follow the same outline as given for Station "S."

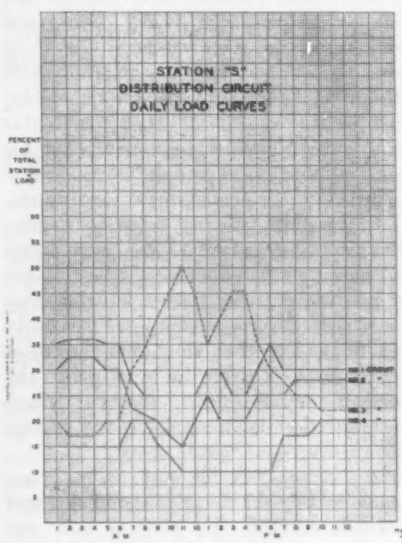
In considering rural voltage regulation problems there are certain items which closely parallel those in urban centers and others which differ considerably. One of the points of difference is the necessity of giving consideration to the regulation of the sub-transmission circuits of various voltages, illustrated in this problem by a 33-kv. line. One of the principal types of load encountered on rural circuits of the Pacific Coast is agricultural pumping. This load is strictly seasonal and may vary from a minimum to the peak of the year in a few weeks time.

For this reason the matter of seasonal voltage control must be given consideration. This control may be handled exclusively at the source by adjustment of the generation or transmission voltage or synchronous condensers may be considered for major load centers. Tap-changing under load equipment sometimes is the answer and induction regulators may entirely satisfy other requirements. The practice of causing a short pre-arranged interruption to change transformer taps twice or oftener in a year might be considered. Other methods not mentioned may also present themselves for the solution of this phase of the problem. Near urban centers, these same considerations should also be applicable to circuits supplying seasonal industrial load. Any or all of these methods of control may be considered in the replies to this problem.

Every problem of voltage regulation involves the question of economics and practicability. At this particular time they should be stressed even more than usual. With these features in mind the relative merits of using bus regulation as illustrated by Station "S" of this problem as compared to individual feeder regulation as used at Station "R" might be discussed. The matter of knowing when to extend primary circuits and add transformers rather than increase the size of the secondary warrants consideration.

Knowing that the customer must be considered in any problem of voltage regulation, the importance to the customer and the operating company in providing a voltage near the rating of the lamps used by the customer enters the problem. There are several "standard" lamp voltages and there is also the choice between domestic and foreign lamps which may interest technical and non-technical employees alike. The various considerations between the efficiency and life of lamps as related to the voltage at which they operate might well receive consideration from persons studying this problem.

Fig. 17—Daily load curves for circuits at Station "S"



General Considerations

In rural communities where there is no competition from natural gas and certain urban districts, the matter of electric heat in the form of ranges, water heaters, incubators and space heaters is exceptionally important. As with lamps there is quite a definite relation between the efficiency and life of the heating elements and the supply voltage. The "speed" of electric cookery is a strong sales point which should be backed up by the operating company in supplying the proper voltage. A discussion of these various features as well as the economic consideration of how far the operating company can afford to go in supplying proper voltage for heating loads has a very definite place in this problem.

Urban centers are no different from rural communities in the matter of considering the proper voltage for the operation of small or fractional horsepower motors. The great increase of domestic refrigeration introduces an entirely new element in the field of residential voltage regulation which warrants considerable discussion in itself. The problems of the method of supplying proper voltage regulation to circuits which serve compressor motors in filling stations deserves consideration. The motor field is now confronted with the relatively new problem of what to do about the 208-volt supply found in network systems. Any phases of this last item which have been successfully met by the operating companies to the satisfaction of the customers are well worth discussion.

The matter of voltage regulation on circuits supplying large industrial or rural pumping motors is an old subject but one open to new considerations at all time. An expression of opinion as to how far the matter of starting current of large motors should be allowed to enter into the overall regulation of a circuit is justified. Another item in the industrial motor field is the possibility of the cooperation of customers having large synchronous motors in assisting with the regulation of their own voltage.

In rural districts where large pump

motors are encountered, the matter of low voltage disturbances operating under voltage release devices and thus losing revenue unnecessarily, or the possibility of high voltage, especially following periods of interruption causing damage to customers' equipment should receive consideration. As mentioned in the first section of this problem, the matter of shift of the neutral may introduce an unbalanced voltage condition between phases which may effect the operation of large motors. These and other problems of large motors offer many possibilities for those interested in presenting solutions.

In concluding the presentation of this problem the matter should again be stressed that to qualify in presenting solutions any small portion of the detailed technical urban and rural setups or any discussion on the general items mentioned may be chosen. It should be considered that a thorough analysis of some small portion of the problem will be of much greater value to the industry than a collection of generalities which attempts briefly to cover all phases of the problem.

In summarizing, the major features presented for consideration include the relation between voltage regulation and revenue, losses and customer good will; the subject of determining what is proper voltage regulation for residential, commercial, industrial and rural customers; the psychology of a customer's past service as it may effect his future attitude towards voltage control and the subjects of shift of the neutral and flicker.

Other items include the regulation of long rural feeder lines, methods of regulation of distribution circuits and the effects of voltage regulation on lamps, heaters, small motors and large industrial and pump motors. Either the urban or rural problems presented in detail may be considered in a solution as units or any small portion of either may be chosen for consideration. Solution of these portions may indicate conditions ranging from excellent voltage regulation to others where the regulation is so bad that the circuit could not even be considered to be in a proper condition for giving service to customers.

The matter of voltage regulation is an involved subject and the more numerous the variety of solutions presented, the greater their value will be to the electrical industry. As a final consideration let it again be stressed that the matters of economic justification and practicability should receive primary consideration in all solutions.

Discussion

Specific Regulation May Answer Problem

By H. H. MINOR
San Joaquin Light & Power Corp.

IS IT not possibly a fair question to ask ourselves whether or not in the past we have concentrated too much on general regulation and not enough on specific regulation problems? Has not our attempt to provide voltage service to our consumers been, to use the popular water analogy, somewhat like trying to regulate all the lawn sprinklers in a large area by manipulating a valve in the main?

Have we taken due care to so revamp our regulation facilities and practices that newer types of load and a more critical consumer is being given satisfactory service as far as voltage at his equipment is concerned? Have we kept up with the parade or are we still back in the days of the torch light procession?

Has our zeal in reducing distribution transformer losses, provided less costly equipment of certain other types or in other ways apparently keeping costs down blinded us to the effect on regulation? Has that zeal really effected economy when the whole picture is considered, and has it not made our regulating problem more difficult?

In providing a solution to the problem of "How important is voltage regulation and what are the most practical and economical methods of accomplishing it?" one is faced with the necessity of a complete analysis of the subject. If he chooses the somewhat typical partial system proposed by Mr. Buese and Mr. Ayres, or any part of it; or if he assumes other typical conditions with which he is familiar he must consider the whole aspect of that particular problem. He must remember that his goal is to provide proper voltage regulation for the consumers' equipment. He must point out just what constitutes that proper regulation. He must detail the measures he conceives as best suited to provide that regulation and he must show that those measures are not only practical, but that they are the most economical. Further he must prove the necessity or advisability of the standard of regulation he assumes as necessary. He must tell the whole story.

In his analysis he may or may not consider present facilities and present methods correct. He may or may not agree that present standards of regulation at the consumer's connection to the company mains are adequate. He may or may not decide that greater expenditures to achieve his goal than is the present practice are advisable. Whatever his decision, he must clearly answer the questions propounded in the problem.

If present practice is incorrect, what should replace it and why? If closer regulation for certain classes of load than for others is advisable, what are the reasons? If greater costs are necessary what is their justifications? If too much is being expended for regulation, where is the waste?

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Voltage Regulation vs. Service Continuity

By R. E. CUNNINGHAM
Farnham & Cunningham

HOW important is voltage regulation? The authors might have well put the question as "which is more important, continuity of service or voltage regulation?" The power companies may have millions of dollars invested in extensive generating plants and transmission systems, but if proper care is not given to the providing of adequate facilities for delivering the current generated in these power houses to the customer's premises, with continuity and at a constant voltage, the investment in the generating and transmitting facilities may be to a large extent wasted.

Granted that a satisfactory service has been delivered to the customer at his entrance switch, has the serving agency discharged its full duty so far as furnishing good service is concerned? A very large percentage of the residential customers and many of the small commercial houses were wired before the era of the Red Seal. No separate circuits have been provided to floor plugs for supplying service to heating devices, radios, fans, refrigerators, mixers and a number of other devices which are now in general use, and innocently the customer connects up all of this load to the lighting circuit of No. 14 wire and expects to receive good service.

You may decide that 115 volts is the average value which should be delivered to the customer's service, and permit a variation of 3 per cent plus or minus from this value, and make all provision on your distributing system to hold to these values. Without some supervision as to what the customer does on his end of the line the best of service voltage can be sadly upset. Would it not be well to add to the various problems an-

other problem involving aproved methods of inspecting customers' house wiring and equipment, this latter to include some common sense illuminating engineering so as to get the maximum efficiency from the service which you have so carefully planned to deliver to the customer's back porch?

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Look Beyond the Meter For Regulation Trouble

By J. G. SINNOTT
San Diego Consolidated Gas & Electric Co.

IN THE first place, where is the proper locality at which to measure a customer's voltage? Should this voltage be measured at the service, at the load side of the entrance switch, or at the lights and convenience outlets? Each one of these places of measurement will leave something to be desired in the way of a true indication of voltage conditions.

It might be said that the responsibility of the utility ceases at the service. That is true in a sense but even with good regulation at the service, there may be poor voltage at the customer's side of the entrance switch due to many conditions between the service outlets and this point, such as corroded switch blades and fuses, small wire from service outlets to entrance switches, blown neutral fuses in 115/230-volt 3-wire services in some of the older installations, and many others.

These conditions have nothing whatsoever to do with the class of service furnished by the utility to the customer, but nevertheless, from the consumer's standpoint are a cause for complaint. These complaints will be costly to the utility in the long run if only from the point of view of consumer good will. Even with excellent regulation at the load side of the entrance switch, the lighting may be very bad due to voltage drops between the entrance switch and the lamps. How far should the utility go in attempting to give a customer proper voltage, whatever that may be?

It has come to my attention that fully 25 per cent of all voltage complaints are high-voltage complaints with the added remark that lamps burn out very rapidly. Investigation will show that the consumers have endeavored to save money by the purchase of Japanese and second grade lamps unsuited for use at any voltage. Should the utility be held responsible for such a condition of voltage regulation, or should the public be educated as to the proper lamps to use? How can this be done without the manufacturers of the second grade lamps crying aloud that the power trust is discriminating against them?

One means of obtaining good voltage regulation in areas having a very dense load would seem to be the primary network, with its corollary the secondary network. Where and when is such a network practicable and what benefits can be derived therefrom? Will it pay to replace an existing radial feed with a primary network, and if so will lower regulation result? Does not a multiple feed system give much better chances for regulation than a unit feed system? The economic feasibility of such a network has been discussed at length and the only conclusion reached is that the problem is peculiar in itself. It may be an excellent solution in one instance and a very bad one in an almost parallel case.

Then in addition there is the question of whether it is better to plan to adjust for a unity power factor or low power factor load. It is quite possible that there may be as much as 30 per cent change in power factor on a circuit throughout the day with very little change in current. Let us assume a factory in the suburbs surrounded by the homes of the workers fed from one primary circuit. In the day time with the factory load and no lighting load the power factor is low. At night with lighting load only the power factor is high. Should the residences have very bright lights at night but good voltage during the day to operate the iron or washing machine, or should the factory be required to operate at low voltage to keep the residences at a proper level? If such a problem exists, what is the solution? Should large industrial loads have separate feeds rather than similar feeds with residential areas?

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Tap-Changers and Regulators May Be Needed

By R. W. COLLINS
Pacific Gas & Electric Co.

ONE of the statements in the paper was the range of voltage variation at the transmission substation from 31,000 to 33,250... This variation of 2,250 volts amounting from 6.75 to 7.26 per cent appears to be quite large for the average transmission system and if permitted somewhat modifies the 10 per cent feeder regulation. The transmission voltage range at distribution station will be necessarily more. Experience indicates that on an average transmission system a daily variation of 5 per cent maximum is consistent with reasonable variation. Distribution stations supplying rural areas having pumping loads, ranges, and lights, if not equipped with voltage regulating devices, must have a supply with a variation of not more than 5 per cent, to prevent wide variation at the ends of the distribution circuits. Where the combined voltage drop from distribution transformers is sufficient to warrant complaints, automatic tap changers are installed on the Pacific Gas and Electric system. Where the transmission system voltage range is wide, it may prove necessary to provide transformers with tap changers as well as feeder regulation. In the course of system operation, the impedance of the transmission line is used by control of the power factor from the power station end, a padding for regulation at one point at a possible disadvantage to other points. This precludes the possibility of maintaining constant transmission voltage, something we all have in mind.

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Methods of Regulation Should Be Analyzed

By H. A. LAIDLAW
Pacific Gas and Electric Company

REGULATION costs plenty. I think it is very essential that the type of regulation required by the area served by any given bus or system be studied very carefully. Is it possible to depend upon bus regulation only? Is it possible to give satisfactory service by giving 5 per cent total bus regulation and 5 per cent feeder regulation? Or, is it necessary that a complete 10 per cent feeder regulation be provided? To illustrate the cost of these various methods of regulation on our systems, I had occasion to consider a 5,000-kw. suburban station with three equally loaded feeders. To provide total bus regulation on 4,000 volts requires about 20 per cent of the cost of the main transformers installed. If it is necessary to provide 10 per cent feeder regulation on the three feeders, the regulators cost about 80 per cent of the value of the transformers installed. From this it might seem that it would be well to provide half of the regulation by means of bus regulation and half by means of individual feeder regulation. However, when we consider the cost of this type of regulation, we find it is higher than the cost of providing 10 per cent regulation on each of the individual feeders. If we provide bus regulation only, it costs 20 per cent of the cost of the main transformers. If we provide 5 per cent bus regulation and 5 per cent on individual feeders, it costs 88 per cent of the cost of the main transformers. If we provide 10 per cent regulation on individual feeders, it costs 80

per cent of the cost of the main transformers, so we don't get anywhere by providing half regulation as bus and half as individual feeder regulation. This is due to the fact that a 5 per cent induction regulation for a feeder of given capacity costs approximately 75 per cent of the cost of 10 per cent induction regulation for the same feeder capacity.

Consider an 11,000 volt station of similar capacity requiring approximately 10 per cent regulation. For a station capacity of 5,000-kw. on three equally loaded feeders, the cost of individual feeder regulation by induction regulators is 145 per cent of the cost of the main transformers. However, 10 per cent bus regulation for this station costs only 25 per cent of the cost of the main transformers. Consequently, if you can get along with bus regulation, that is certainly the thing to install. Five per cent regulation on feeders and 5 per cent on bus will cost about 150 per cent of the cost of main transformers. If you can get along with step-type regulators on your feeders and step-type on the bus, and if you split your regulation into 5 per cent regulation on the total bus in a step-type regulator (either tap changers on the transformer or separate regulation) and use 3-phase, step-type regulators on your feeders, your total cost of regulation will be somewhere in the neighborhood of 75 per cent of the cost of your main transformers. That is by far the most economical thing to do unless you can give satisfactory service with bus regulation only.

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Start With Satisfactory Voltage Limits

By C. E. SCHNELL
San Joaquin Light & Power Corp.

SHOULD we not endeavor to establish some limits of voltage between which from our fund of experience we can state there will be produced satisfactory operation of consumer equipment? Having done this, then each problem will require its own particular solution.

In setting or arriving at any such limits, let us make them as broad and as inclusive as possible for the closer the limits, the greater will be the costs. And speaking of costs, don't forget that for every item of cost that we add to our electrical systems, we are also adding to our capital accounts and postponing the time when we can further reduce our rates.

Whatever we do we must take the systems we now have as they are and improve them either in their entirety or here and there where the need is the greatest. This latter plan is one which is the most simple and which no doubt offers the greatest good for the least money.

Suppose one day Mrs. Consumer calls in and says, "I have flickers" and you say, "That's too bad, but it's due to that So and So Company's electric refrigerator your neighbor just purchased and our company is sure sorry," and you hang up and forget about it. Haven't you missed the fine opportunity to go out and probably find that the secondaries serving Mrs. Consumer and her neighbors are only No. 6 when due to the growth of load in her vicinity, the secondaries should have been changed long ago and this new refrigerator is just the last straw on the camel's back?

I just wonder if there are not many similar cases of long postponed and necessary improvements. We don't often think of this sort of thing when we consider voltage regulation, but doesn't this perhaps offer a wide field in which to answer our problem question?

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Determine a Standard For Voltage Regulation

By C. R. BENSON
General Electric Co.

SOME voltage surveys have indicated that the variations in voltage to the customer may be wide, but that these complaints are not shown up because the public is not conscious of low voltage, or because the low voltage condition is not accompanied with a flicker and therefore not reported. The problem of the proper method of checking customer voltage is one phase of the question of regulation that needs answering.

The solution of this problem will answer two questions, first, how close to the nominal value is the voltage maintained during the evening load period and during light load periods and second, what are the most important causes of variations in users' voltage?

If the answer to this second question is due to voltage drop in secondary circuits, is this due to inaccurate voltage regulator settings and are voltage regulators set to the best advantage, too low regulator capacity, overloaded transformers or overloaded feeders?

It is certainly true that the revision of house wiring has not kept pace with the addition of appliance load. Is not a part of the flicker and poor voltage condition due to inadequate wiring, especially in older installations?

On some secondary circuits flicker and low voltage are caused by starting currents of small motors. This drop is due to the reactance and resistance of the feeder circuits and transformers. Can this condition be improved by changing the size of copper and changing the spacing, or by running shorter low voltage circuits?

The feeder circuits with large motors are recognized as being difficult to regulate, especially if the circuit has any lighting load. The drop is due principally to the reactance of the circuit and automatic regulation as it is generally known is not fast enough to take care of the flicker due to the motor starting current. As a recommendation the series capacitor may be used for such a line. The voltage correction is dependent on the instantaneous current and the correction is instantaneous inasmuch as there are no moving parts to this type of equipment.

Are there means of cutting off some of the load during peak load conditions? Will the load that can be cut off materially improve regulation? Although this may not be so important at the present time, it is a condition that will become more and more apparent as load is added to the lines due to increasingly attractive rates.

Improvement in transformer regulation will help to improve conditions. What is the economic value of better regulation in transformers?

On some systems voltage regulation can be materially improved by the addition of feeder regulators. On other systems the regulation can be improved by other types of equipment. Large banks of transformers can be supplied with automatic load ratio control. Banks now in service can have step regulation added at reasonable cost.

What regulation are rural feeders entitled to? Should they be regulated with small feeder regulators, small step voltage regulators, or equipment designed to automatically boost the voltage 5 or 10 per cent when a definite minimum voltage is reached on the rural feeders?

A most important problem is the amount of investment that can be made in regulation for rural feeders based on the returns in revenue to the utility. New and lower cost regulating equipment is available and must be considered in answering this.

Industrial feeders present another problem. Poor power factor increases the drop in the feeder circuits due to the higher current required for a given load. The power factor of industrial plants is recognized at present in the power rates. Should there be more incentive to improve the power factor?

The question of voltage regulation for various types of load areas cannot be answered by a single solution, but each individual type of load area must be considered as a separate phase of the regulation problem.

What Factors Limit Service Policies?

By C. W. LEIHY
Electrical West

SERVICING and maintaining consumers' equipment is a problem as old as the electrical industry itself. In pioneering electrical applications in the early days, the utility was forced not only to supply kilowatt-hours but also to sell, install, service, repair and maintain their consumers' electrical installations. No other organization was available to do these things. It was fairly common practice for the power company to furnish motors as an inducement to consumers to change to electrical service. Practically all companies in the early days furnished free lamps and free lamp renewals. One or two large companies in the East still continue this practice.

As electrical service became more widely adopted, other branches of the industry were able to relieve the power company of a portion of the responsibility for electrical growth. Manufacturers developed aggressive sales organizations and contractors took over much of the installation work. Consumers, however still turned to the utility for help when electrical trouble developed.

In the first twenty-five years of this century technical development proceeded with such rapidity that the reliability of service improved to a marked degree. Consumers gradually came to regard electrical service as indispensable and adopted it to perform many necessary and essential functions. Service interruptions due either to trouble in the power supply or in the consumers's wiring or apparatus became increasingly inconvenient so that power companies made intensive efforts to render better and more reliable service. The direct result of this was gradually to educate the consumer to expect a high degree of continuity of power supply.

From the engineering standpoint assuring the consumer of a reliable current supply was not particularly difficult. However, the fact that energy was available was of no benefit to a consumer whose fuses were blown, whose wiring was unserviceable, or whose appliances were burned out. When electrical trouble developed consumers naturally turned to the utility for help and to keep these consumers satisfied with electrical service and with the power company, departments were developed by the utility to take care of such complaints.

As public relations has been a paramount problem of the past nine years, and as service departments appear to be one means of improving public relations, service and maintenance departments often have been called upon to render service far beyond any reasonable limit to retain the good will of the public. Unfortunately this method of securing good will leads to the formation of customer habits which lead the consumer to expect increasing amounts of free service as a normal procedure for the privilege of selling kilowatt-hours.

The Problem:
How Much Free Repair and Maintenance Service Can and Should the Power Companies Give Their Customers?

It is to focus attention on this growing problem that this question is propounded to the Engineering Section: How Much Free Repair or Maintenance Service Can and Should the Power Companies Give Their Consumers?

The study of the problem of free service and maintenance does not lend itself to a rigorous mathematical analysis as do most of the problems undertaken by this organization. Expenditures which may be made by power companies in providing free service and maintenance cannot be evaluated in the accustomed terms of "additional kilowatt capacity," "percentage increase in efficiency," "greater reliability" or "saving in dollars operating expense." In providing this type of service the utility is investing in the intangible but none the less very real benefits of consumer satisfaction for electrical service, better public relations, fostering the growth of the electrical industry, and others of a similar nature.

To what extent power companies are justified in spending real money to secure these intangible benefits is the objective that it is hoped will be attained from a study of this problem by the Engineering Section. To clarify the scope of this investigation, two fundamental conceptions must be borne in mind. The most important is the truism that the future growth and prosperity of all branches of the electrical industry depends upon genuine satisfaction of the users of electrical equipment and services. The second is that service and maintenance, furnished either with or without charge to the consumer, must be rendered by a part or all of the industry because of the technical aspects of its services which are little understood by the layman.

Two hypothetical limits may be assigned for the study of this problem. At one extreme the power company renders no free service whatsoever. At the other, the power company owns, services, and maintains all of the wiring and appliances of the consumer and sells complete lighting, cooking, laundry, percolating and all other electrical services individually or in combination according to the desires of the consumer and his ability to pay. The former involves practically no servicing expense to the utility; the latter requires not only a large operating expense but also a huge investment in wiring and appliances. Either at or somewhere between these two limits lies a solution to the servicing and maintenance problem which will incorporate the maximum return per dollar invested in satisfying consumer complaints.

To arrive at a solution to the problem the tangible factors such as operating expense, fixed investment in tools, transportation and supplies, departmental overhead, personnel training and other expenses must be evaluated in terms of the intangible results possible from this outlay of funds. Such intangibles include:

1. Possible loss of revenue due to delay in answering complaints.

2. The consumer's attitude toward the company as it may be affected by the amount of free service and maintenance provided by the company.

3. The consumer's satisfaction with the use of electricity as it may be affected by too many complaints or unsatis-

factory handling of the complaint either by the company or other service organizations.

4. The effect that varying amounts of free service and maintenance supplied by power company will have on intra-industry relationships.

5. The legal liabilities incurred by the power company when service or maintenance extends beyond its own equipment which in the case of the consumer is the meter.

Obviously this relationship between the tangible and intangible factors adds to the complexity of this problem and necessitates not only a thorough investigation and study of all its phases but also good judgment in fabricating the structure around which an acceptable solution can be built. So interrelated are the various phases that it is doubtful if any one solution could incorporate all of the desirable components and eliminate all of the undesirable factors. This being the case it should be the aim of the investigator to present a solution which incorporates as many of the desirable and as few of the undesirable elements as may be consistent with practical operation.

Also complicating a practical solution is the radical difference in conditions prevailing between rural and urban areas. A plan for free service and maintenance suitable for the urban consumer may be entirely unsatisfactory in the rural areas from the aspect of both the consumer and the company. Hence, the investigator in choosing his solution is faced with the possibility of providing recommendations for both rural and urban practice should a single plan prove too inflexible to meet successfully the wide variation in conditions between these two classes of customers.

From operating data, it appears that approximately 28 complaints per 1,000 consumers per month may be expected under the present conditions of electrical usage. Among each 1,000 consumers in the urban areas, 20 complaints will originate each month. From each 1,000 rural customers about 31 complaints per month will be received. About 75 per cent of the complaints are received after working hours. Considering that there are over a million and three quarters consumers in California, it is apparent that approximately 50,000 complaints per month or 600,000 per year are registered by users of electricity.

Costs for serving each complaint vary from 80 cents in the congested areas to as high as $5.00 in rural territories. These figures include only operating expense and do not take into consideration the costs of investment in transportation facilities, tools, buildings, etc., necessary in service department operations. From the foregoing, it is apparent the "free" service and maintenance is costing the utilities of this state well over $1,000,000 per year. Stated in another way, the utilities are spending more than $1.00 per year per consumer taking care of complaints, in many cases rendering service at no cost to the consumer far in excess of what he has any just right to expect.

The object of this problem is to determine (1) how much money, if any, can be spent profitably on free service and maintenance in building public relations, consumer satisfaction and a greater acceptance for electricity. (2) How to spend this money so as to obtain the maximum results from the activities of the service department.

Complaints by consumers make service and maintenance necessary. It may be of some interest to list a few of the more common complaints and the responsibility for repair. Items marked with an (*) imply a company responsibility; those with a (†) a consumer responsibility.

No lights or no power*†
High or low voltage*
High bills *†
Moving services†
Faulty wiring†
Radio noises*†
Unserviceable appliances†

A large percentage of complaints will be found to originate from causes beyond the control of the company and indirectly due to action or the lack thereof on the part of the consumer or the manufacturer. Yet complaints represent annoyances or inconveniences to the customer which must be corrected by some skilled electrical technician if the consumer is to be kept sold on electrical service. Either by habit, nature or intuition, the consumer almost invariably complains to the power company and expects immediate attention in correcting any electrical trouble generally without expense to himself.

In determining utility service and maintenance policies which may be recommended several factors must be considered. First, has the consumer any legal, moral or implied right to demand free service and maintenance for his wiring and utilization equipment from the power company? If he has, then the problem resolves itself into a determination of the quantity and quality of such service and the economics of rendering it. If he has not, the first consideration is the attitude the power company should take toward providing such service. Should the utility establish a policy of rendering no service other than that of delivering power to the consumer's premises? Is the expenditure necessary to render a reasonable quality and reliability of service justified? Would a limited amount of free service such as merely inspecting the premises and recommending action to correct the trouble be satisfactory? Would larger amounts of free service pay dividends in better public relations, etc? Would service rendered at cost relieve the company from service expense without incurring a corresponding liability in sales resistance to the sales of energy and in hampering the growth of the industry? Is the utility a logical organization to handle consumer complaints? These and other questions are involved in the analysis of the policies to be followed.

To enable a better visualization of the conditions surrounding this problem, a chart has been prepared to illustrate the possible relationships between some of the factors entering into its solution. It must be remembered that intangibles are being dealt with and that attempting a graphic portrayal of an intangible is at best an expedient selected as the most expressive means of conveying the thought. Hence, these curves are neither accurately calculated nor have any factual basis for their shape. They merely express possible relationships.

The positive or upper portion of the graph represents the effect of free service upon the important factor of public relations. The equation for such a curve is purely hypothetical but it appears reasonable to expect that in moving along the abscissa (representing increasing amounts of free service) increasing values of "favorable consumers' attitude" should be obtained. At one limit where no service is rendered dissatisfied consumers can be confidently expected. At the other limit, the curve probably will flatten out and approach a point beyond which additional free service or maintenance will bring no improvement in public relations.

Further liberties were taken with accepted mathematical principles by using a vector quantity to represent cost of service. The length of the chords connecting the origin with various points on the curve indicates the relative cost of rendering a given amount of service. It can be seen that these values become progressively larger as the curve approaches its limit. In other words, near the point of origin small expenditures in service represent large gains in consumer acceptance. As more service is given, costs increase with great rapidity until they become all out of proportion to the corresponding gain in public relations.

On a strictly mathematical graph, the most economical operating point con-

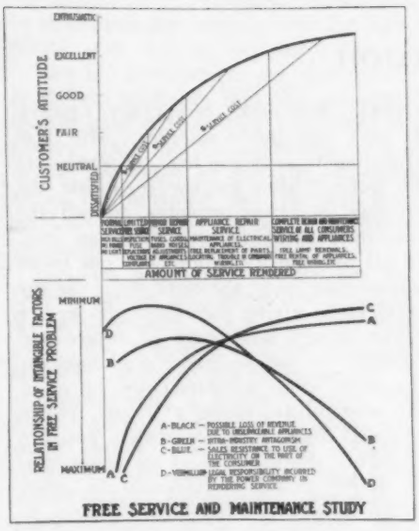
sidering only cost and public relations would be where the rate of increase of the public relations, the ordinate, becomes smaller than the rate of increase in cost—the point where the dollars invested in service cost produces a maximum in terms of incremental gains in the consumer attitude. But this is not a mathematical problem, neither are public relations and cost the only two factors that enter into its investigation. There are several others, all intangible, which have been plotted on the lower section of the chart as negative influences.

Curve "A" represents potential loss of revenue to the power company due to unserviceable wiring or appliances which might be corrected by an aggressive service policy. This curve has its maximum where little or no service is rendered, its values decreasing with increasing amounts of service.

Curve "B" represents antagonism which might be generated within the electrical industry to the detriment of industry cooperation by free service rendered by the power companies. When a utility renders little service it is doing little to build an electrical market, a condition which promulgates an antagonistic attitude on the part of the manufacturers. If the utility rendered large amounts of service it is liable to encroach upon the field of the electrical contractor and dealer in repair and maintenance business. Hence, this curve passes through a minimum point somewhere between the two limits arbitrarily set for this discussion.

Curve "C" is very important in these days of load building efforts. It represents sales resistance on the part of the consumer as it may be affected by the amount and quality of free service rendered by the utility. As might be expected, its shape is similar to curve "A" passing from a maximum to a minimum as service is increased.

Curve "D" is the legal responsibility that is incurred by the utility in rendering increasing amounts of service. Normally the utility's responsibility ceases at the meter. Electrical conditions on the consumer's premises are of no concern to the power company unless they are obviously hazardous. Then the utility is responsible for calling attention to this condition to the owner or tenant. If uncorrected the utility can either refuse service until the repairs are made or to continue service and accept an implied responsibility for accidents or damage that may result from the hazardous condition. In rendering service to and on the consumer's premises, the utility accepts responsibility for the acts of its agents and for damages that are directly attributable to those acts.


CUSTOMER'S ATTITUDE
ENTHUSIASTIC
EXCELLENT
GOOD
FAIR
NEUTRAL
DISSATISFIED
AMOUNT OF SERVICE RENDERED
RELATIONSHIP OF INTANGIBLE FACTORS IN FREE SERVICE PROBLEM
MINIMUM
MAXIMUM
A-BLACK – POSSIBLE LOSS OF REVENUE DUE TO UNSERVICEABLE APPLIANCES
B-GREEN – INTRA-INDUSTRY ANTAGONISM
C-BLUE – SALES RESISTANCE TO USE OF ELECTRICITY ON THE PART OF THE CONSUMER
D-VERMILLION – LEGAL RESPONSIBILITY INCURRED BY THE POWER COMPANY IN RENDERING SERVICE
FREE SERVICE AND MAINTENANCE STUDY

Vectorial representation of some of the factors which affect the problem of free service and maintenance.

The law of agency holds, and when rendering service beyond the meter, the utility implies that it accepts the attendant responsibility. There is no set guide for legal interpretation of the aspects of liability arising from free service. Each case involving the responsibility of the power company is decided upon its own merit. An efficient service organization will minimize or eliminate potential losses from this source. The curve of legal responsibility is shown to increase with increased service. However, efficient inspection and repair service will minimize potential damages and losses due to this responsibility and another curve might have been included to show that such losses probably would decrease as service increased because hazardous conditions would be discovered and remedied more quickly.

An inspection of these negative factors reveal that the minimum point on each curve is the most desirable condition to be attained. As the minimum points are shown to occur at various values along the abscissa the problem then becomes one of determining the best compromise point not only for these curves but also in conjunction with those shown on the upper half of the chart. In determining the compromise point, evidence of its practicability from an operating standpoint should substantiate the selection.

Choosing this point automatically fixes the policy on free service and maintenance that is recommended. How then is this policy to be put into effect? How are complaint calls to be handled in rural areas—in urban areas? In urban areas, could a contractors' organization relieve the utility of answering service complaints entirely—or only during business hours? Would intensive training of service personnel in public relations be justified by a greater return for their activities? Can customer habits be changed? In short, to justify a recommendation on this problem a description of the mechanics of its operation is necessary to explain why one solution appears superior to any other possible solution.

To recapitulate briefly, solving the problem of free service and maintenance involves a determination of the best policy to be pursued by public service companies and a description of practical procedure for its execution. In so doing the investigator must consider, on one hand, the broad aspects of consumer satisfaction as they may affect the growth and prosperity of the electrical industry; on the other, the cost to the utility and the effect that its service policies may have on the manufacturer, the contractor, the dealer and other component parts of the industry. By sifting, weighing, evaluating and correlating the many and varied factors of the problem in the logical and methodical manner characteristic of engineering investigations it may be possible to recommend and establish policies that will prove definitely beneficial to both the industry and its consumers. Certainly the great potential benefits possible from such an investigation makes it worthy of serious study by the Operating Economics Section.

Reward

The modest monetary prizes set up for the best solutions to these problems are, in no sense, to compensate the winners for the time and thought they give to the preparation of their solutions to these problems. To the winners will go the satisfaction of having contributed tangibly to the progress, the stability and the prosperity of the electrical industry. To them also will be accorded the recognition that such contributions must bring from their superiors. Perhaps the greatest reward of all will be the satisfaction of each contestant in knowing that he voluntarily assumed a responsibility, cheerfully completed a task and personally contributed to the advancement of the industry.

—Arthur H. Markwart.

Discussion

Rural Complaints May Justify Special Study

By W. P. BEDGOOD
Pacific Gas & Electric Co.

ADMITTEDLY the consumer of electricity is entitled to a certain amount of maintenance service without charge. Two-part rates (service commodity charge) are designed to permit each consumer to pay the cost, as closely as can be determined, for the service actually received and used by him.

The service charge covers the cost of the utility to serve a customer regardless of the amount of commodity used. A small part of this cost reimburses the utility in answering complaints and is based on the cost of handling complaints over an entire system of all the consumers on a given rate schedule.

During the month of September, 1934, the Pacific Gas and Electric Company received 16,536 complaints, as follows:

	Type of Complaints	No.
1.	No light, no power; consumers premises	6,727
2.	No light, no power; company lines	2,081
3.	Appliances	4,488
4.	Voltage	212
5.	High bills	1,579
6.	Radio	124
7.	Others	1,325
	TOTAL	16,536

Complaints per 1000 Consumers

	Type of Complaint	Sept., 1934
1.	No light, no power; consumers premises	10.4
2.	No light, no power; company lines	3.2
3.	Appliances	6.9
4.	Voltage	.3
5.	High bills	2.4
6.	Radio	.2
7.	Others	2.1
	TOTAL	25.5

These figures show that less than 26 consumers per thousand receive service either without charge or charge made for parts only. However, if we use a 12 months period we find that 312 out of every 1000 consumers receive this service; or in a three year period practically all of the consumers would receive repair or maintenance service. These consumers may be divided into two general types: urban and rural.

Mr. Leihy states that a free service and maintenance plan may be suitable for the urban consumer, but unsuitable in the case of the rural consumer. Let us consider a "no light" complaint received at 9:00 p.m. coming from a lighting consumer 12 miles from headquarters. The serviceman arrives at 9:45 p.m. He finds the house wired with only one lighting circuit and upon testing finds the circuit bad. It takes more than fifteen minutes to find the trouble and make temporary repairs. It may take thirty minutes. His total traveling time is 1½ hrs. It would not be policy, after failing to locate the trouble in fifteen minutes, to tell the consumer to phone an electrician who, in all probability, would not put in an appearance until the next day. By the serviceman giving the consumer service (even though temporary in nature and whether or not we make a charge for the extra time involved) we have, in all probability, made a friend. Even in small towns it is not always possible to secure the services of an electrician at night, and a serviceman is often called on to make temporary repairs to wiring.

In the larger towns with higher standards of wiring a high percentage of the buildings have two or more circuits and the loss of one circuit is not quite as serious. The consumer is usually willing to wait until the next day if temporary repairs cannot be readily made, and in a great many instances does not call the utility at all.

It is a known fact that the rural complaints cost more to complete than the urban, due principally to the distances necessary to travel in the rural territory in answering the complaint. This is also true in other activities in the rendering of service to this type of consumer such as reading meters, collecting, etc. For this the service charge is only slightly higher than in urban territory.

Here is an interesting point: Out of 50 "no-light" complaints in the city of Santa Rosa, the average elapsed time between receiving the complaints and restoring service to the consumer was 48 minutes. Out of a similar number of rural complaints of the same nature the elapsed time was 1 hr. 33 minutes. The complaint tags from which this information was compiled were taken from our files at random. Many of the rural complaints were close to town, but it is safe to believe these to be average figures in this location. In more sparsely populated areas the elapsed time would probably be longer. This shows that two complaints can be handled in small urban areas to one in the country.

Whether or not two separate plans of repair service, one for each territory, would be satisfactory is hard to say. The rural consumer has a higher percentage of major appliances than his city cousin who uses gas for cooking and heating. This is only one of the many factors to be considered. Furthermore, the two plan idea would result in discrimination. Before reaching a decision, the investigator should consider the trend of rural load. He may find that the revenue per consumer in the back country warrants more repair service than can be given in cities.

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"No Power" and Appliances Cause Most Complaints

By O. R. EVANS
San Joaquin Light & Power Corp.

IN DISCUSSING this problem, consideration should be given to what is being done now. The general policy followed by the Pacific Gas and Electric Company covering free service includes the replacing of fuses without cost for labor; time limit of one man-hour on the premises servicing major appliances, such as ranges, space heaters, etc. of over 2-kw. capacity; two man-hours for the servicing of water heaters; and fifteen minutes for minor repairs for servicing small appliances in special cases. Service work, such as cleaning water heaters, repairs to piping and valves, is not included in our free service. This type of work as a general rule is referred to the contractor-dealers. Actual location of the trouble in wiring on the customer's premises is also generally referred to the contractor-dealers.

I have made some notes on service calls for the San Joaquin Division, Pacific Gas and Electric Company system. These notes cover an average of approximately 40,000 customers, both urban and rural. The service calls are broken down on the basis of calls per 1,000 customers per year.

No light or power—Fault on customer's premises 172
These calls cover the replacing of fuses, minor repairs and adjustments.
No light or power—Fault on company lines 27
Appliances 114
These calls have to do with major appliances, such as ranges, water heaters, space heaters, etc.
Voltage 8.2
Radio 3.7
These calls are to locate the source of interference, either on the customer's property or company lines.
Services 24
Others—not classified 20
Total 368.9 per 1,000 customers per year.

Average 30.7 per 1,000 customers per month.

I have not noted the amount of money involved in the handling of these calls.

No doubt it is large enough to demand attention.

There are three vitally interested parties in this problem: customer, utility, and contractor-dealer. The customer naturally comes first, and any plan made by the other two must give serious consideration to the customer's position in the general scheme of things.

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Precedent Responsibile For Service Costs

By H. B. WELLS
Los Angeles Gas & Electric Corp.

IN further amplifying this problem of free repair or maintenance should not the competitive angle be injected for study? Is not more free service demanded and rendered by this than any other factor? Normally is competition not considered a matter of securing new business? However, has it not, under existing conditions, developed also as a matter of holding existing business?

Can we not divide competition into two major classes for this discussion: First, competition from other electric utilities; second, competition from private plants, i.e., gas, Diesel, and gasoline engines? Have we, in analyzing the first, taken enough care to avoid policy matters? Is it not true that many precedents have been established by policy that, may we say, has backfired?

Haven't all power utilities at some time or other, under the pressure of gaining some competitive business, established a precedent which latter has cost many dollars in free maintenance service? Are we encouraging the use of "Class B Vaults" beyond the limits of good business? How many times have "Class B's" been promised so as to give that extra super-service needed to get the name on the dotted line?

How many times has 100 per cent transformer capacity been installed, when good operating practice tells us that a diversity of 30 to 50 per cent should have been adequate, simply because we felt that we could not offend the consulting engineer who demanded it? Do we always weigh the fact that a "Class B" in a building will not allow us to take any other load from that bank of transformers, while a bank of transformers in the street could also be used to supply the line running up and down the street?

Why are we called upon to supply two circuits? Is it always necessary? How much additional maintenance does this add to our yearly operating costs? Does the revenue derived justify this additional expense? In case of an outage how many times have we sent a man from our shops to operate a manual double-throw? Should several rates be developed that would cover the additional cost where various types of "Class B" installations are demanded? Is it not equitable that the consumer should bear part of this additional expense? Does not the difference in cost of the two types of installation, street or in the building, fall in that free-service class which has been established by pressure of competition?

How do private plants, gas engines, Diesel engines, etc., affect free repair or free maintenance? Are they ever used as a club in getting a little extra free service? May we cite an example: A consumer with a fairly constant 500 amp. load adds a few more motors. The main switch is a 600-amp. air-break type. Main fuses blow when these additional motors are started. Power company is called on a low voltage complaint; charts are demanded and installed. After considerable time and money has been expended consumer is convinced that voltage is correct. A larger size main switch is recommended. An electrical contractor is called on the job to install a larger switch.

A new angle enters—cost. The consumer learns that next size switch above 600-amp. is a 1200-amp. oil-type switch. The high cost causes the consumer to look around, and in the meantime the fuse condition remains the same. The gas engine man is called in. The electrical contractor, feeling his contract slipping, remembers that, on a new job which he had installed some time back, this same problem of 600-amp. switch being too small came up and, the cost of a 1200-amp. switch being a factor to get the contract, the utility had obtained permission from the Inspection Department to use their own pole top switch in lieu of a main switch. Thus the load was split in such a way that smaller sub-main switches could be used. The contractor informs the consumer and the stage is all set to receive that back fire which was spoken of before. Utility is called and asked that a pole top installation be made or else!

Will the consumer get his request? Can he be blamed for taking advantage of this saving? Can these precedents be broken, or is there not a danger of this request and others of a like nature becoming a fixed policy? Might they be avoided by a closer understanding between the operating and business departments?

How is this type of "free" service to be charged? Is it a just charge to "Distribution Costs" when every utility is attempting to lower this expense? Can it be charged to new business or should it be charged as a reduction in rates to the consumer? A study of our policies may help.

Does Competition Govern Service Policies?

By J. F. HODGES
Southern California Edison Co., Ltd.

THE paper prepared by Mr. Leihy covers the general subject so completely there seems to be little left to expand. However, some problems that are perhaps allied to this general question, may be worthy of discussion. It is not intended to discuss the types of complaints that may be questionable as to any joint responsibility of the utility and the consumer, such as no light or power, high or low voltage or high bills. No one can dispute the fact that these complaints require attention and, since the utility must finally concern itself to some extent in such complaints, they do not present some of the problems that are present in those cases where the utility steps over the threshold and into the office, factory, store, or residence of the consumer for repair and maintenance of consumers equipment.

It is stated that in the beginning it was necessary for the utility to pioneer the uses of electrical service by the sales, installation, and repair of equipment. Have we ever gotten beyond the pioneering stage in the promotion of this servant. Do we sell kw.-hr. as measured by the meter or are we selling a service. It has been a long road over which we have traveled from the introduction of the incandescent lamp to the latest air conditioning equipment.

Certain appliances have filled a real need and have been readily adopted by the consumer. Beyond a brief period of development by the manufacturer and promotion by the utility they have needed no great sales effort. The radio and the refrigerator are two of these items. Many of these appliances have had no competitor with which to dispute this field, there being only a choice of which manufacturer's product the consumers prefer to purchase.

Some of the applications of electrical service and ones that have proved a very satisfactory load to the utilities have had the keenest of competition. The electric range and water heaters have entered the field in the household against an established and progressive competitor and, as a result, these two items have met with considerable sales resistance. It has required a very alert Commercial Department to introduce and promote them to the present state of usage. It hardly can be denied that if this policy had not been pursued their usage would have been restricted. Beyond the period of guarantee by the manufacturer these appliances are somewhat of a burden to the power com-

pany. In the zeal to get this load on the line have the utilities overlooked a few features of standardization that might have been required by the makers of these articles that would have simplified the problem of maintenance and repair, either to the consumer or utility?

Many companies make lamps of different sizes, shapes, and wattage, but each one up to certain sizes fits the same socket. It does not require a trained and competent utility employee to attach it to this socket. The consumer walks into the nearest dealer, asks for the size lamp wanted, takes it home, and attaches it to the socket without any aid from the utility. This is also true of most portable appliances. Would it be impossible to so design and standardize the range that the elements would fit the opening in the cooking table of each manufacturer and be attached in such a manner that it would be as simple as plugging a portable cord into the service outlet. In the event the range heating element should fail the consumer could purchase any manufacturers element that might be their choice and make the connection without the aid of the power companies range troubleman. Would it be too late even now for the utilities to give some thought to this subject to help to reduce the cost of repair and maintenance, regardless of who pays the bill, the utility or the customer.

In the consideration of the amount of money that may be spent profitable on free service and maintenance in building public relations, consumers satisfaction, and greater acceptance of electricity, there enters the question: "Upon what basis can the consumer expect any free service beyond the guarantee of the article or appliance?" Is it a question of service cost that is hidden in the price of energy by which we attempt to purchase good will by giving away something that is not a part of the utilities obligation? Is this service given without cost to some special appliances and not others? Is it an attempt to overcome some of the defects of manufacture that we render a free service to create consumer satisfaction? Is it an attempt to create greater acceptance for electricity that we render a free service and maintenance of appliances or, to speak frankly, to overcome competition.

Consider the radio, an appliance that produces a revenue of about $7.00 to $9.00 yearly. Does any company attempt to render a free service on radios? Do we consider that it is necessary to have competent employees for the repair and maintenance of other appliances and leave the radio with its complicated circuits to the dealer to make repairs when necessary? Has this policy retarded in any way the promotion of the radio?

Consider the present day refrigerator. During the brief period of introduction the utilities were forced to have competent men to make repairs and adjustments to them. The manufacturers have since so far perfected this machine that at the present time some of them are willing to give a five year guarantee for its successful operation. Has the perfection of these refrigerators with their guarantees gone further to provide consumers' satisfaction and to promote the further acceptance of this appliance than free service or maintenance could do?

Would it be practical to provide fuse service on the basis of fire-station service, such that a call might be answered within a few moments, day or night, or would it be more profitable to spend the money in an endeavor to educate the consumers as to safe method of putting in a fuse and leaving a few fuses in case of an emergency? Would it be of advantage to the utility to foster the use of circuit breakers, such as the "flip-on" in order to eliminate the fuses entirely and give the customer a chance to reclose the circuit in the same manner as he now does any tumbler switch?

Would a loan department set up in the service department and provided with an assortment of appliances to be used while the customers apparatus is undergoing repairs be any inducement for them to bring their defective appliance into the shop? Should repairs be limited to those sold by the utility only? Could any satisfactory arrangements be made with some outside source to handle these complaints in order to avoid some intra-industry antagonism?

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Cooperation Extended By Contractors

By EDWARD MARTIN
Sterling Electric Co.
San Francisco, Calif.

I WANT to speak about the million dollar free servicing that the utilities are giving away. That million dollars I dare say represents about a third of available business that has been available in California during the past year. There has been practically no new construction work and I would say three million in California divided among the contractors in California might be acceptable if they could handle it. If that million dollar business is profitable to the utilities, would it be profitable to the contractor? Is the electrical contractor in the urban territory set up to take care of the various complaints? As the preceding speaker says, it takes a variety of facilities. Are the electrical contractors in the urban areas willing to equip their establishments to take care of their business?

In the rural areas are the contractors set up to take advantage of this work that the utilities are now taking care of? The problems as presented in the urban and rural areas differ greatly. You take in the rural areas, a phone call might come into the utility that the consumer has no light. A man would have to drive 25 to 30 miles into the country to take care of the complaint. After driving out there, he will find the fuse is out, that the fuse has blown due to some defect in wiring, motor, appliances, etc. It is reasonable to expect the utility man to notify the consumer that she should get in touch with the contractor or should the contractor graciously step aside and let the utility remedy that. Another factor to be brought up, is the contractor in the rural districts dependent upon that particular type of work for his livelihood? If so, why are the utilities taking away this business from him? Again, if the utility cuts out all servicing, do they tear down their servicing to the consumers? Have they a right to do so?

There is no objection from code authorities in this area (San Francisco) if we can arrive at a reasonable decision. We are working under a code in California better than anywhere else in the United States. I shall assure this gathering that our code authorities will not do anything to interfere with this problem. Any solution that you may arrive at, I am sure that the contractors will cooperate with you whole heartedly. I extend to you our cooperation.

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Standard Repair Parts Will Aid Solution

By F. S. BENSON
Pacific Gas & Electric Co.

THIS problem is increasing each year with the addition of domestic electrical equipments that are sold our customers. Customers are usually not electricity conscious until their lights go out or some part of their domestic equipment refuses to function properly; then, in their distress, they usually think of the power company first. For electric range maintenance alone, the companies are forced to maintain large stocks of repair and replacement parts in their warehouses and the capital tied up in this material is considerable.

Each range manufacturer supplies coils and bricks for his particular types and models of electric ranges. The

bricks vary in diameter and in shape of the patterns of the spiral grooves for retaining the coils. Coils are made in practically unlimited number of ratings, diameter of wire, and overall lengths.

The warehouse has an increasing problem in attempting to stock the different materials required for electric ranges. Each year as new models were brought out by the manufacturers, there are changes in switches, coils and some times in brick patterns. Our substore warehouses in the division offices are compelled to keep a considerable amount of this range stock on hand and the investment is large.

The serviceman is also forced to carry a varied assortment of parts so that he can make as few calls to the customer as possible. However, it must be borne in mind that it is impossible to carry repair parts for all makes of electric ranges, water heaters, and other appliances; therefore, there is considerable delay in servicing some customers and they do complain. Practically all the customers also complain of the high cost of replacement parts. In working on a solution for this problem, remember that the prices of identical replacement parts supplied by different manufacturers vary considerably.

Relay equipment such as the load demand relay used with water heaters, imposes additional burdens on the company; the serviceman must become familiar with industrial contactors and relays in order to repair them quickly and must have a knowledge of testing procedure in order to calibrate such relays.

The electric refrigerator merchandising companies have, in the past, maintained their own servicing bureaus, but now the picture may be changing as the prices of refrigerators are such that a host of small manufacturers are entering this field and it seems likely that the companies will be forced to do some repair and servicing work in order to satisfy the customers' demands.

Such domestic electrical equipments as vacuum cleaners, electric washing machines, ironers, and radios are repaired or maintained by dealers or repair companies. Why must the power company assume the burden of electric range and water heater maintenance? Why are not private repair companies equipped to service this equipment? Perhaps there is not enough margin of profit to make it attractive to them.

The problem is extensive. It includes public relations and capital investments. What shall the company's policy be, limited servicing or complete servicing? The personnel engaged in this maintenance work are agents of the company; they can damage the reputation of the company or they can build up a feeling of good will toward it. The behavior of these men in the customer's residence and on his premises must be above reproach. Therefore, personnel must be chosen carefully.

Obviously, the company must own and maintain the major equipment used in service work, such as the trucks, etc., but what of the tools that are necessary to make the repairs, should they be the property of the servicemen or the company? The expenditure for tools may become a burden, especially if testing equipment must be carried.

There may not be a complete solution to this problem, perhaps only a partial one. However, the ever-expanding demands for service requested from the public utility by its customers must be recognized and answered.

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How Much Service Does The Consumer Demand?

By G. H. SEARLE
Pacific Gas & Electric Co.

THE PAPER presents the broad aspects of a problem which vitally affects the industry. The contestant will be faced at the outset with the necessity for assigning to each of these aspects its proper value. To do so will entail consideration of more than detailed matters, which, while being somewhat to one side of the major problem, by no means can be disregarded. I desire that my remarks be taken as merely an attempt to place before you some of these matters, and by no means as offering a solution.

In evaluating the cost of service, the time and transportation of the workman are not the sole consideration. The complaints must be received and routed, the workmen dispatched, and their needed material supplied. If your solution suggests that material be supplied free, its cost must be included. If, on the other extreme, your solution involves charging for all service, some thought must be given to the question of what the consumer can afford to pay for service. Mr. Leihy has pointed out the probability of customer dissatisfaction with limited free service. Another consideration is that maintenance costs if too high may impel him to curtail the use of his appliances.

A matter for careful study is presented by the attitude of the public. How much free service does the customer think he should have and how much is he willing to pay for? A solution of this question will go far toward an evaluation of the upper curve.

Will increasing acceptance of electrical appliances bring public familiarity with their construction and maintenance, and so reduce requests for service? Or will the increasing complexity of controls for automatic operation result in more demand for service?

What about mechanical repairs? Some mechanical troubles may render a piece of electrical equipment inoperative such as stoppage in the pipe from a water heater to the tank, but chipped enamel on a cooking top does not interfere with the use of the stove. Other mechanical troubles may result in inconvenience to the user. What should the utility's policy be?

Apartment house dwellers probably exercise less care in the use of appliances than do the home owners and renters. Should they be rendered the same service, or should apartment managers be encouraged to take care of their own servicing? By what means could this be accomplished?

Utilities are now experimenting with special offers for increased consumption, looking toward the possibility of reduction in energy rate. What will be the effect of lower energy cost on demands for appliance service?

To what extent are temporary repairs warranted? At times, of course, they are unavoidable. Frequently, however consumers demand them where they will certainly result in a repeat call in a short time. Whether you think that material should be sold or supplied gratis, under what circumstances should temporary repairs be resorted to?

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Can the Necessity For Service Be Reduced?

By A. W. COPLEY
Westinghouse Electric
& Manufacturing Co.

MR. LEIHY presents a problem of which serious consideration is warranted. It could, however, be made more comprehensive and the solution could be made more complete if it were extended by the introduction of an additional factor.

Closely allied to the problem as set forth by Mr. Leihy is that of the possibility of a reduction in the amount of free service obtained by reducing the necessity for service. The problem therefore might well include that of means for eliminating as far as possible the failures of circuits or apparatus on the consumers premises.

It is obvious that if the trouble experienced by consumers could be reduced or eliminated, the demand for service, and therefore its gross cost, would respond in the same manner, and at the same time no penalty would be incurred in customer relationship. How then can the consumers troubles be reduced, and what can the power

company do to bring this reduction about?

To answer this question, it is essential that we know what conditions occasion the bulk of the customers calls. Possibly this data is already available, and could be incorporated in the statement of the conditions of the problem. If it is not readily available, some research as to the proportions of the various classes of trouble would be a necessary part of the work of solution.

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Keep the Consumer Sold!

By C. E. SCHNELL
San Joaquin Light & Power Corp.

IN discussing this topic of consumer service, may I suggest that the term "free" should not be used as it is a misnomer. No service which we give is free but is all included in the cost of doing business and is part of the price of the kilowatt-hours which we sell to our consumers. To the individual consumer who gets service without additional charge it may appear to be free, but that consumer has paid his part of the cost along with all of the other consumers.

In answering the problem question of how much maintenance service can and should the power companies give their consumers, I would say as the Two Black Crows on the radio said—"a certain amount!"

By this I mean we should give such service, but it should be part of a definite program of company responsibility for the satisfaction of its consumers. Therefore, I think the word "give" is also wrong; I would say we "owe" it to our consumers that their use of our products be as convenient and as satisfactory as it is possible for us to make it.

How do we get our consumers' equipment on our lines? Most largely by some form of new business or sales activity. The cost of this activity has long been considered a legitimate expense and all companies have sales departments and salesmen to get the prospect to sign on the dotted line. Having done so, should the customer be bade a "fond adieu" and sent on his way with a hope and a wish that all will be well and that everything will turn out O.K.? My answer is an emphatic "No!" for having made a sale and perhaps made it necessary to increase our facilities to serve this consumer at some considerable expense, then is when our greatest interest in this consumer should begin. We hope to have this consumer a long, long time and any service that is rendered him is just part of the expense to keep him sold on the article he purchased and on the commodity we have to sell. In the past too much emphasis has been placed on selling a consumer and too little on keeping him sold. This maintenance service is one of the principal things that keeps the consumer contented.

A contented consumer will use more kilowatt-hours and be a better friend of the power company than one who, due to our neglect or indifference, thinks all we care about him is to get him loaded up with a lot of electrical equipment by high or low pressure methods.

If one of our consumers has trouble with her range, the chances are that she doesn't think of the dealer who sold her the range nor of the contractor who wired it in for her, but rather she thinks of the power company whose energy has always been available at the turn of the switch. When the serviceman gets this range repaired and Mrs. Consumer mentions that her iron cord is giving her trouble, what should the serviceman do then? He shouldn't hesitate; he should quickly make the repair with a comment on how interested his company is in seeing that all of the equipment of each consumer is in first class shape and used as much as possible.

No doubt the fact that most companies have some form of so-called "free service" has caused many consumers to add to their electrical equipment, thereby increasing our connected load when otherwise they might not have done so. This is a very definite credit for such service and the manufacturer, the contractor and the power company are all favored with their share of this new business.

Certainly this is a field where all interested parties can get together and none feel that the other through selfish motives are treading on his rights. After all, we are working to give the consumer the best we have for it is the consumer who supports us all whether we be a manufacturer, contractor, or power company.

Everyone a Salesman

I AM wondering if the commercial department of each utility is being accorded the help to which it is entitled. It is probably the most important department in the business today. It brings in the money and does much to determine our public relations with the consumer. By its daily contact with the customer, it can measure and build good will and point the way toward better public relations for the rest of the personnel of the company. I have stated to our own management group that, in our company, everyone from the president down must be a salesman. If everyone in the industry would study this question, "What can I personally do to help solve our problems?" I am sure it would result in much constructive accomplishment. — Harry J. Bauer, Chairman of the Board, Southern California Edison Co.

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Standardizing Repair Parts Improves Service

By S. J. LISBERGER
Pacific Gas & Electric Co.

A MANAGER of a large department store in San Francisco told me about three years ago they spent $50,000 a year on what they termed adjusted complaints. The department store is in a different position to that of the utility. They can make price tags what they like, the utility being regulated as to the price it can charge for its commodities.

We are not selling kilowatt-hours but service. If you have a consumer using 1,500 kw.-hr. a year, which is above average, he is using approximately 4 kw.-hr. per day, costing 20 cents. Although the consumer may be interested in the 4 kw.-hr., what he should be interested in is the benefits he gets from that energy and we should stress to our consumers that we are not selling kilowatt-hours but service and convenience.

We devoted considerable time to a study of the problem of replacement parts for ranges. The Pacific Gas and Electric Co. has 54,000 ranges on its system, ranges of every type, kind and description and the parts for one will not fit on most of the others except by chance. To provide adequate service on ranges it was necessary for our house to stock 200 separate coils. Because of the wide variety of coils it was often necessary for the serviceman to make two calls to repair one unit, one to find out the type of coil necessary and the other after he had sent to the main warehouse to obtain that particular coil.

To improve our service we took one of our best engineers and put him on a service wagon for two weeks to fully acquaint him with the service problem. He spent two weeks more studying the data which he had collected. Inside of two months we had developed five coils that will fit practically any range on the system, a solution which has cut warehousing costs and improved our service to the consumer materially.

Today's Market Opportunity Is in the Home

By GEORGE D. BELSEY
President, The George D. Belsey Co., Ltd., Los Angeles
and
H. H. COURTRIGHT
President and Manager, Valley Electrical Supply Co., Fresno

THE entire electrical industry is today more keenly interested in and affected by the answers to this question than it has ever been in its history. Its favorable solution will provide imperative load for the utility, sales volume for the appliance vendor and improved living conditions in the American home.

It has been an important question for three decades and no discussion of its future solution can ignore the tremendous past contributions of utility, vendor and consumer to the present fine volume of domestic current consumption. Yet, every student of present-day use of electricity in the home recognizes and can tabulate in statistical form a vast, undeveloped market. These statistics need no repetition here, as each branch of the industry is acutely conscious of its past achievements and its future opportunity.

Accepting the market opportunity, the purpose of this discussion is to outline the more important elements in the future development program and to emphasize the individual and collective responsibilities of utilities and vendors in the drive for future increase.

In approaching this problem, it is natural for the electrical industry to become almost immediately introspective—to think at once of our weaknesses, our incapacities, our lack of adequate sales equipment, our internal friction and competitive antagonisms, our personal instead of our collective ambitions. These internal elements are in large part our daily experience. It is human for us to be more impressed by our failures and difficulties than by our successes and accomplishment. Being fully acquainted with our own conditions and quite familiar with the performance of the rest of our industry, it appears logical immediately to point out the problems within the industry, the solution of which will contribute to greater success in load building.

The major internal problems are of a general nature and are applicable to all types of appliances, so little reference will be made in this paper to specific opportunities for load building within a given classification of appliances. If the general problems can be recognized and solved, they will contribute much to the solution of such problems as how to sell electric cooking, refrigeration, water heating, air heating, domestic lighting and others.

The Problem:
What Are the Most Effective Methods of Increasing the Domestic Use of Electricity?

Rates

The first hue and cry is, of course, that rates are too high; but let us pause to give some really serious thought to the question of just how much effect rates have upon the purchase and use of appliances. Are electric bills a vital factor in any family budget? If rates were cut to a fraction of what they are today, would there be a great rush of people into dealers' stores to purchase electrical appliances?

When times are good, prices high, and everyone is making money. the public gives little thought to electric rates; but as bad times approach, as prices drop and unemployment increases, then comes the demand for lower rates. If we will look back at the relationship between commodity prices and the cost of electricity in 1913 and follow it down to the present time, we will note that whereas commodity prices increased tremendously during the great war and then slumped to a little below present prices, but at no time reached the 1913 level, the cost of electricity has followed a definite downward trend until today it is approximately 20 per cent to 30 per cent below the 1913 index. The public however, forgetting past reductions in the cost of electrical energy when everything else was rising, could only see the subsequent tumbling commodity prices with little movement in the cost of electricity. The public judges only by comparison.

Do people desire to use much more electricity than at present, being restrained only by feeling that the cost is too great in proportion to the comfort and convenience it affords; or have we failed to sell them upon the value of our product? By "rates" do we actually mean rates or do we mean cost? If it is actually rates which are retarding sales, would a simplification of rate structures to make them more easily understood solve the problem? If so, how should they be expressed?

People distrust what they don't understand. Electricity is actually cheap (though it may be cheaper), but the only part of an electric bill that people understand is the dollars and cents charge. Because they don't understand the charge, they fear increasing it, at least with any major current-consuming appliance. Can the utilities make their bills understandable to laymen and housewives?

With the advent of the many time and labor saving devices for the home, the electric bill can no longer be called the light bill. Such a designation is a misnomer. The electricity consumer for lighting represents only a small portion of the electric bill. In checking the average electric bill against the average family income, we find that it makes up between 1 per cent and 1½ per cent of the budget.

It has been the history of the most rate reductions that increased use of electricity followed. As load-building increased consumption, lower rates have resulted: lower rates, greater consumption. Other factors which have a bearing on the true operation of this cycle have been pointed out above—namely, competition and increased costs.

With the general retrenchment in the use of electricity on the part of consu-

mers most utilities found their revenues drastically reduced. How to overcome this problem and again acquaint the consumers with the advantages and utility of electricity and to arrest their curtailment in use has been the objective of every electric company.

If "cost" is meant, rather than "rates," there is one very important point for consideration in reaching a solution to this problem. Manufacturers, wholesalers, and dealers all look to the utilities to do much of the promotional work on appliances. They carry on extensive advertising campaigns, conduct cooking schools, lighting classes, maintain speakers' bureaus, in every way endeavor to further the sale of appliances. Many of the utilities do not sell merchandise directly, hence they derive a return from this expenditure only through the results as reflected in dealers' sales. Yet this expense is a definite part of their cost of doing business and as such reflects itself in the rates. If rate reductions necessitated a curtailment of these promotional expenditures, would the lower cost of electricity stimulate public buying of appliances to a degree that would offset the business lost because of the less aggressive merchandising efforts?

Cost of Appliances

Is the cost of appliances themselves a retarding factor working against their more widespread use? Is there a popular desire to use electricity for various domestic purposes which would be unleashed if the appliances were obtainable at less cost?

Without wide distribution of appliances, no load building program can be successful. Low cost appliances no doubt would open up a large field among the people in the lower income brackets. It must be borne in mind, however, that operating and service costs of such appliances must include long term financing which spotlights such pertinent problems as cost of money, collections, repossessions, and who will bear the burden. While this very program is now under way through the government sponsorship of TVA, it is well to keep in mind that private utilities have no such government subsidy nor an unlimited supply of tax funds to replace deficits. Every undertaking of a private concern must justify itself on a strict business basis. Any other method would prove unsound.

Electric appliance dealers are of necessity interested in making a profit. It takes as much effort and time to sell a low-priced appliance as it does the higher priced ones. He must sell many more appliances to obtain the same profit. With the advent of low cost appliances more concerns will be added to the list of appliance dealers. Many concerns not now handling electrical appliances will add them as a sideline, and while more appliances will undoubtedly be sold, the present electrical dealer will feel more keenly the severe competition.

Would the increased demand afford the manufacturers an opportunity to employ mass production methods which would enable them to reduce list prices yet maintain the same margin of profit for the dealer? Or would the dealer margin have to be pared if the prices to the customer were lowered? If the present difference in price between reputable, standard merchandise and inferior substandard merchandise were reduced, would the quality appliances absorb the market now confined to undesirable goods? Would low-margin volume produce greater aggregate returns than are obtained on the present basis?

Cost of Wiring

Frequently it is said that the reason people do not use more electricity is because they cannot attach their appliances conveniently—that we need more adequate wiring in our homes.

There is no question but what this statement is correct. One has but to note the quantity of devices designed to aid in obtaining greater service from existing installations and to observe the wide-spread use of these devices to realize that most wiring jobs are pathetically inadequate. The point to be borne in mind in this connection, however, is that there has been a steady increase in the adequacy of domestic wiring throughout the past fifteen years, during which time there has been a concerted educational effort on behalf of better wiring. Would it not seem, therefore, that this particular phase of the problem can best be solved by an educational campaign? If so, how can the message be carried most effectively to architects? to builders? to the home buying public?

It is also said that the cost of wiring is the reason wiring jobs are not more adequate. A most important factor in the sale of these appliances is the cost of installation. After the salesman has sold the prospective customer on the advantages to be enjoyed by using an electric range, water or air heater and has fully created the desire for ownership, it becomes necessary to proceed with another sale—namely, the wiring cost. Thus, two sales are forced on the salesman if he is to successfully complete the contract.

Some companies have attempted to solve this problem by offering free wiring or what is in effect the same; they have allowed enough on a trade-in for an old appliance to cover the cost of wiring.

A large proportion of the prospective customers for heavy-duty domestic electric appliances are tenants and do not own their own homes. They are hesitant in most cases to invest the amount necessary to cover wiring costs in a home they do not own. Each time they move another wiring expenditure is necessary unless by chance they should obtain a house that had been previously wired.

A few utilities have attempted to set a standard price for wiring through an agreement with contractor-dealers and add this price to the range, thus enabling all dealers to quote the price of their equipment installed. This plan has had many drawbacks, the most important being the inability of the dealers to agree on and maintain any fixed wiring costs.

Any plan which would eliminate successfully and harmoniously the sales resistance created by installation costs would have a stimulating effect on the sales of heavy-duty electrical appliances.

The above relates, of course, to the sale and installation of appliances in an already completed home which is, of course, our major market. We must bear in mind, however, that if a proper selling job had been done and these homes had been adequately wired when they were constructed, there would have been no inadequacy to add to today's sales problem. By virtue of this same reasoning, we must recognize that every home built today will at some time in the future be either a ready market for appliances or "a hard nut to crack" depending upon the amount of sales effort which goes into the wiring job while that home is being constructed. In dealing, therefore, with the question of cost of wiring, your problem divides itself into two phases, (1) additional wiring in old homes and, (2) adequate wiring in homes under construction.

When you realize what a very small figure the wiring cost represents in relation to the total cost of a building, we feel that the real reason for inadequate wiring is that the industry failed properly and completely to sell a desire for adequate wiring or a realization of its importance in our present standards of living. How can the industry bring this point home to the public? Wiring does not have the eye-apeal of attractive hardwood floors, lovely tiled bathrooms, or beautiful linoleum or wall paper. How can its proper bearing upon the enjoyment of a home be stressed so that it will be appreciated fully?

If you are one of those who believes that wiring costs are too high, how can

they be lowered? Are contractor's profits too great? Are the safety requirements of codes and ordinances too stringent? If these safety provisions were reduced, would builders put in more adequate wiring for the same amount of money or would they drop their installations to the standards of the new requirements to save the difference, thus reducing the adequacy of the job? Thus far, the experience has been that speculative builders and the so-called "carpetbagger" electric contractor recommends installations which barely comply with the minimum requirements compulsory under local ordinances. If ordinance standards were lowered, how could this tendency be offset? If fewer outlets and less copper capacity were permissible under the law, how should the industry proceed to promote more adequate installations?

Salesman's Compensation

There is one internal problem which has a very great bearing on any program or effort to increase domestic use of electricity, and this subject deserves a spotlight. The electrical industry needs better salesmen and better salesmanship within its ranks. The work of salesmen in the electrical industry has not been a profitable occupation. For the retail salesman who is assigned the task of securing orders from householders, such employment, by universal practice, is on a commission basis. It has required that the salesman devote a large part of his time to doing a market development or educational selling job. While the salesman should be properly trained to do a creative selling job and will always find some of this work necessary, the personal method of developing prospects is slow, time-consuming and expensive, and has minimized the salesman's results. Isn't it possible that the electrical industry places on the salesman too great a task for too small compensation, or isn't it possible that the salesman is not being compensated on the right basis by being paid a commission to do market-development work?

Do the present methods of compensating salesmen attract the highest type of salesmanship to the electrical industry? If not, how can this be remedied? Would the increased sales of a good salesman pay the increased cost of his hire over that of a poor salesman? Where a utility only promotes sales through the dealers, does a salesman do the best job on a commission or on a straight salary?

Lighting

One class of domestic use which is somewhat different from all others is lighting. Here we have an absolute household necessity which results in electric service going into over 90 per cent of the homes in California whether they use electricity for any other purpose or not. Yet the industry has fallen far short of its responsibility to give its customers the best. Here we are merchandising not only comfort and convenience, but actual well-being. In many thousands of homes, our customers are using our product and our service not as intended, to increase seeing, but actually to impair sight. There is probably not one home in every thousand which does not need changes in its lighting that would result in relieving eyestrain for the occupants.

How can this important message be told effectively to the public? This field, probably more than any other, offers an opportunity for building domestic load, and it is a field in which no competitive fuel is encountered. What method would you suggest to bring the important message of *correct* home lighting to our customers?

All of the problems indicated to this point can properly be classed as internal problems. They are a part of our every-day experiences within our own businesses.

It is, however, almost equally obvious that our progress in the future depends, regardless of ourselves, upon the customer's point-of-view, the man and woman in the home. What they know about electricity and electrical appliances; what they think of its value to them; what they do to secure these values; these are, in reality, the factors that will determine our future progress.

The Customer Is King

It is an axiom of modern business, and an all-important truth, that the "Customer is King." While it is essential that we organize and operate effectively within our industry to increase the use of domestic electricity, it is of vastly greater importance that we recognize the householder's attitude toward the usefulness of electricity as the focal point of attack, the problem requiring greatest attention, the field for greatest improvement. For the moment, therefore, let us forget rates, prices of appliances, sales organization and the related internal problems.

There are two fundamental characteristics of American people. (1) The urge to improve their standard or method of living; (2) the determination to buy anything they really desire, if they can possibly pay for it.

These two characteristics have not been altered by the deprivations of depression. They have, to the contrary, been intensified. It is probably more true today than ever before that American people would rather have what they can get with a dollar than have the dollar. In spite of bitter want, the "Forgotten Man" clings to his American heritage of personal possession and comfortable living as his greatest privilege, and no political party or governmental system can win his allegiance if it calls for the sacrifice of *his* possessions or *his* enjoyment of good living.

If this definition of the buying possibilities of our prospective consumer of more electricity is true, then we should but state the relationship of our electrical service and products to his sense of possession and standard of living. It can be affirmed and proved that no great industry serving and selling to the American consumer has available such a wealth of true and convincing facts regarding the values of its service and products as the electrical industry. No other offers the home-owner such permanent opportunities for investment in a combination of luxury and utility. None can so positively enhance the home-maker's sense of pride of personal possession, so surely improve his standard of living, so permanently guarantee the continuance of satisfaction as the result of spending his dollars.

These qualities of the electrical industry are well recognized and accepted within the industry, and outside, too, in the stated opinions of business observers. They are repeated here only as a sound premise for emphasizing the main problem in increasing the domestic use of electricity.

Telling the Public

The main problem, in the opinion of this paper, is greater and more effective consumer education on the usefulness and advantages of electricity in the home. The average householder does not know enough about electricity, has not been aroused to a full appreciation of its services through appliances in comparison to other products and services for which he is now or is contemplating spending his dollars.

Many in the electrical industry will point with pride and satisfaction to large advertising appropriations and campaigns; to the editorial forces, national and sectional, that continuously present our merits; to the word-of-mouth promotion that the more enlightened present-day users of electrical appliances are constantly spreading among their own circle of less-informed home operators. What is being done is good; what is being done helps and is a real contribution to present-day progress. But if it is the desire of the electrical industry to accelerate the pace, to materially increase the domestic use of electricity, what is being done now to educate the prospective user is not enough.

Is it not true that the programs of advertising must be increased in volume; that they must emphasize the usefulness of electrical appliances rather than the merits of particular products; that they must tell the story from the consumer's point of view, rather than the story of product superiority or other personal sales advantages? More advertising that educates will produce more buyers. On the other hand, more adtising by majoring in sales claims actually minimizes sales results and increases the costs of the industry without enlarging its opportunity.

When the men and women of Pacific Coast homes are more thoroughly educated on appliance use, vendors will collectively and individually sell more appliances. Hence, all vendors should turn the intent of their advertising to more educational purposes.

Electrical appliance vendors are fortunate in having a strong ally who is vitally interested in assisting in this education, the utility. It is a real problem to coordinate this assistance so that the greatest good for the industry can be secured. At present, the two forces do not have adequate unity in educational appeal. This can, and should, be improved. Educational advertising is most effective when associated with a brand name. Would not utility advertising be most influential and better coordinated if the utility assisted the vendor in that part of the vendor's advertising which is directly intended to be educational?

Better education of prospective consumers is the most effective method available for increasing the use of electricity. This is an external activity which will make all internal activities and improvements more productive.

When advertising has done its job in a bigger and better way, salesmen can get results quicker *if* they are properly prepared to do the necessary closing work.

Manpower

May we repeat that the industry needs a better type of man-power than is employed, on the average, today. If the industry, by its publicity efforts, shows that it believes people can be sold, it will encourage more able men to join in the venture. These able men need better training to represent the industry. Somehow, every individual in the electrical industry, executive and salesman, must be brought to realize that his own interests are enhanced and his business improved by encouraging the public to buy electrical. It is a real problem to develop salesmanship that includes constructive effort to sell the vendor's own products and at the same time sells the electrical idea. We need every salesman, every executive, building market opportunity for himself, as well as for others. Next to market education, the big problem of the industry is to encourage better salesmen to engage in electrical work and to broaden the ability and vision of these men by a unified sales education on the story of the electrical industry as a whole.

This paper has attempted to indicate a few problems that vitally affect the increased use of domestic electricity. It has been emphasized that they are industry problems, belonging to both vendor and utility. There is one aspect of the basic question which the writer of this paper believes may not be generally recognized. The rate of failure, or at least, retirement from the appliance vending industry, among distributors, dealers and salesmen has been tragically high. It cannot all be attributed to lack of fitness and ability or lack of reasonable opportunity. In considerable measure, many, even most, failures have been due to the fact that the cost of selling an appliance is too high in proportion to the gross profit resulting from that sale. And by no means has the record of failures been largely the product of the depression years.

There was an astonishing mortality in the years when general business was prospering. The selling of electrical appliances as a business occupation has not been profitable. It is the writer's impression that in time and money, more has been invested in the business of selling electric appliances than has been received in earnings. In the relatively few instances of apparent success, the margin of earnings over investment has been unfairly small for salesmen, dealers of distributors, and it must be borne in mind that once the earnings of a given sale have been acquired, no further direct revenue accrues, while, on the other hand, the sale becomes a potential cost liability through service.

It is intended to point out that there exists a major problem in properly appraising the relative value and cost to the utility and the vendor of producing increased load. True, the vendor has no alternative, if he is to continue in this industry, but to incur sales and promotion expense. The purpose of the discussion at hand, however, is to find ways and means for materially accelerating the job of domestic load building. The writer repeats that it is a major problem to divide equitably the cost of this accelerated program between the recipients of the temporary revenue, the vendor and the recipients of the permanent revenue, the utility.

Discussion

DISCUSSION of the problem, "What are the most effective methods of increasing the domestic uses of electricity?" was participated in by W. S. Fleming, Southern Sierras Power Co.; H. C. Rice, Southern California Edison Co.; W. L. Frost, Southern California Edison Co.; L. F. Galbraith, Pacific Gas and Electric Co. and J. F. Stephens, Jr., Apex Rotorex Manufacturing Co. The folowing extracts from their remarks are pertinent:

Considering the problem of rates, the question arises, "Are rates really high?" Or do we merely believe them to be high? Have we failed in educating the employees of the electrical industry in general? Have they failed to educate those with whom they come in contact? Some thought might be given as to just how much we individually know as to what determines the establishing of rates and what justifies them. Is this question of rates really a problem or just an alibi?

There are salesmen on our floors and salesmen on the floors of all concerns who will agree with customers who purchase appliances that rates are too high. Is the understanding of rates to be left to the utilities alone or is the industry as a whole going to accept some of the responsibility of informing customers? How is this problem to be handled?

One company has 485,000 domestic meters and 520 active dealers on its lines, an average of 900 domestic customers per dealer. From Jan. 1 to Nov. 1 these dealers have sold about $5,400,000 worth of appliances. It might look as though there are too many dealers for the market. It is difficult to understand how that many dealers can make a living with only 900 customers each. On the basis of sales to date, the total volume of appliance business for 1935 will approximate $7,300,000, or an average of $14,000 per dealer. This problem should be given consideration by the manufacturers and wholesalers who have put these dealers into business and who keep them there.

It must be remembered in dealing with this problem that we should not sell one kilowatt-hour or a single appliance to a customer unless it is in the customer's interest to use them.

People are inclined to take electricity for granted. One of the problems is to inform them so that they will look upon the electricity they use in their homes in terms of convenience, pleasure, health, cleanliness, sanitation and service. How can we do this?

Find Ways to Increase Electrical Consumption

By H. N. CARROLL
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and
R. C. McFADDEN
New Business Manager, Southern California Edison Co.

STUDY of the data submitted from over 100 sources in answer to a request for assistance in the preparation of this paper indicates that in general, from a load-building standpoint, the industry is faced with five fundamental problems:

1. The development and securing of new loads not now existent in this territory.
2. The retention of existing business.
3. The obtaining of such loads as are now being served by so-called competitive power.
4. The development of increased usage by existing consumers. All business obtained under this classification, whether commercial industrial or agricultural is undoubtedly the most profitable business to the industry and probably the most neglected. It represents business actually connected to lines but unused at the present time. Will this business normally come on when economic conditions improve or must increased usage be developed by intensive educational work in the nature of explanation of service, rates, and increased value to the consumer?
5. The recovery of business lost during the past few years.

In the solution of this problem, we must take into consideration certain factors that are pertinent in a general sense to all of its development and also to all of the various types of load involved.

1. It must be recognized that the state of California probably has as cheap, or cheaper competitive fuel available in large quantities than any other state in the union. By the same token, it must also be recognized that California as a whole enjoys very low rates for electricity.
2. It is also a fact that California is definitely faced with a large excess of power which, from the present outlook, will not be needed for 15 years, more or less, unless new uses are developed at a greater rate than at present.
3. Consideration of responsibility for new developments in equipment utilizing electrical energy, also responsibility for proper maintenance of stocks of materials and equipment at advantageous distribution points.
4. Uncertainties of public opinion due to political development and the influence of the press which has generally been unfavorable toward private ownership of electric utilities are further important considerations.
5. Business conditions and particularly the influence that would result from inflation or changes in our monetary system are disturbing elements. This is especially true as utility rates are established by governmental agencies, making for a slow process of advancing electric rates to correspond with rising costs.

The Problem:
What Are the Most Effective Methods of Increasing the Commercial, Industrial and Agricultural Uses of Electricity?

Applicable across the whole load-development question are the following more specific problems:

1. The development of better and more coordinated industry advertising.
2. The problem of rate simplification.
3. The problem of rate adjustments.
4. The problem of providing additional sales man-power.
5. The problem of improving public relations as a prerequisite to successful load-building.

Then, dealing more specifically with the three subdivisions of power sales, namely, light, power, and heat, the following specific problems have been suggested:

LIGHTING

Commercial Lighting:

1. The problem of increased use lies largely in the solution of the financing problem involved in the remodeling of old installations and in the installation of new equipment.
2. The problem of increased use involves the selling of the story of "Science of Seeing" not only to the general public but also to architects associations, business men, manufacturers, industralists, electrical dealers and electrical contractors—all in the shortest possible time.
3. The problem involved in the development of a suitable rate for commercial lighting must be solved if appreciable amounts of such load are to be obtained.
4. How can the general public be educated to the use of high grade lamps developed under I.E.S. standards rather than the off-grade cheap lamps which have been flooding the market? The retention of existing commercial lighting business has been primarily that of defending lighting load against the attacks of unscrupulous organizations which have taken advantage of economic conditions to dishonestly sell their products on a wattage-reducing cost-saving basis. What is the best method of combating activities of this character—more aggressive salesmanship, advertising, educational courses, or some entirely new technique?
5. If more commercial lighting load is to be obtained, the problem of supplying better engineering service combined with the ability to make more contacts and using better selling methods must be solved.
6. How can the vast amount of commercial lighting load lost during the past few months be recovered?
7. The opportunity to obtain additional commercial lighting loads is seriously handicapped by the inadequacy of wiring both in older buildings and in new installations.
8. What methods not now being used should be adopted for the promotion of lighting for public playgrounds?
9. How can advertising and sales programs be planned in order to develop the realization on the part of merchants that merchandise sales are in direct proportion to the amount of store lighting used?

A solution of these problems is imperative.

Industrial Lighting:

1. It is very evident that lighting standards in industrial establishments in California are not keeping pace with developments elsewhere. Is it not possible that the educational features and advantages of lighting are left too much to sales people who are interested primarily in the power end of these establishments? Are rate structures conducive to improvement in lighting?

2. The problem of selling the idea of better industrial lighting involves the sale of the following ideas to consumers:

(a) The means of increased protection.
(b) A safety measure for employees.
(c) Protection to outside equipment in storage.
(d) Protection against trespassers.

How best can these ideas be sold to industrial managers?

Street Lighting:

1. The problem of developing a suitable educational campaign to arouse the general public on the necessity for more street lighting. Those cities purchasing power direct from the power company for street lighting have, almost without exception, reduced street lighting to a minimum. If additional street lighting is to be obtained, the following points must be sold to city authorities:

(a) To convince city authorities that adequate street lighting constitutes a very cheap form of police protection.
(b) That it increases public safety.
(c) That it enhances property value.
(d) That it is an inexpensive form of city advertising.
(e) That the amount of money saved through curtailment in no measure offsets the direct losses in the above items to the cities.

How best can this be done?

The solution to the political problem which involves a better relationship between the industry and the governing bodies of our municipalities must be reached before appreciable amounts of new street lighting loads can be obtained.

Misunderstanding between municipal officials and power companies, in many cases due to street lighting costs and rates, must be eliminated if additional business is to be obtained.

How can this feeling be eliminated?

The problem presented in the recovery of lost street lighting business consists of informing city officials, as well as citizens of the cities themselves, in the necessity for adequate street lighting and in the false economy of curtailment.

How best can this be done?

Highway Lighting:

The problem in furthering highway lighting consists of:

1. Convincing the traveling public that highway lighting is essential to safe driving and to create a demand from the public for such lighting.

2. To convince the state highway authorities and all auto club officials that the cost of highway lighting is a proper charge against maintenance and payable out of gas tax funds.

How can these problems be solved?

It has been proved that the proper illumination of highways contributes not only to the safety and comfort of those using the highways, but that a definite economic saving accrues to the community, which saving is two or three times the expenditure for lighting; therefore,

How can a sane highway-lighting program be initiated and carried to a successful conclusion?

Industrial Power:

In a class of business not so susceptible to the usual creative sales mediums, but influenced more particularly by general economic conditions, how far can we go, or how far should we go to stimulate increased usage of electricity? The following problems involving industrial power are suggested for solutions:

1. The problem of obtaining additional load from industries involves the creation of promotional rates that will be competitive with other forms of power now being used.

2. The problem of establishing promotional power rates which will attract basic industries such as chemical plants, electrolytic processes, ore smelting, etc.

3. The problem of substituting electric power for oil and gas where those fuels are being used in process heating operations.

4. Are all of the electro-metallurgical and electro-chemical uses being given consideration at the present time?

5. The problem of retaining the power load in industrial plants where such plants have use for process steam, and also the problem of preventing such plants from engaging in power generation.

6. Should the industry accept the responsibility of pointing out what might be termed by-product uses of current? What further studies should be made to point out availability of raw materials that could be used for or in manufacturing processes?

7. Increased industrial power use revolves around the location in California of new industrial plants. How can such plants be induced to locate here?

8. The problem involved in the development of schedules for low-priced power for such industries well in advance of the advent of such power is imperative.

9. Do our present rate structures properly encourage the off-peak use of current?

10. The problem of displacing gas and oil as competitive power in industry emphasizes the fact that the electric rates must be on a competitive basis, and if such fuels are to be displaced this rate problem must be solved.

11. The problem involved in increased uses among industrial consumers is to find new uses and bring these uses to the attention of the owners. How best can this be done?

12. It is also apparent that the industry has not kept pace with the advantages to ge gained by the electrification of transportation systems and in the introduction particularly of the new trackless trolley. What definite action should be taken to correct this situation?

13. How can the industry overcome the misunderstanding in the minds of power consumers on the matter of rates and earnings?

14. The need for a more general understanding among power users of the various elements involved in power cost when power is developed from an isolated plant as a means of overcoming the prevailing idea that the difference between the cost of electricity and the cost of fuel constitutes the difference in cost between purchased power and isolated plant operation.

15. The problem of devising electric rates which will not affect existing revenues but which will encourage greater electrification of industry.

16. To hold existing industrial loads and in order to obtain additional loads from existing consumers, better engineering service combined with greater effort, more frequent consumer contact, and better selling methods must be adopted.

17. During the past few years, there have been many attempts on the part of competitive equipment manufacturers to install their equipment in place of electrical equipment. The industrial user of electricity has been inclined to lend a very sympathetic ear to proposals of Diesel engine and steam turbine salesmen for the reason that, with a decrease in manufacturing volume and in the price of raw materials, he has seen his power costs remain at the same levels; therefore, becoming day by day a larger proportion of his production cost. When these power costs are examined on a basis of units of production due to decreased volume his unit

power costs are higher in the face of reductions of all other manufacturing costs.

What general measures should be taken to block the inroads of this competitive equipment?

Should the utilities maintain a special sales force cooperating with electrical equipment manufacturers?

Does the proper understanding of our rate schedules affect the plant management in making decisions on competitive equipment?

Do men of the industry, other than utility salesmen, understand rate structures sufficiently well to explain them to manufacturers in their contacts with this class of consumer?

Has the industry accepted the responsibility of seeing that the equipment is being operated in the most efficient manner?

Oil Industry:

1. The elimination of all discriminating features in the power rates to this important $3,000,000,000 industry of California.

2. On some method of reducing oil lifting cost on some 7,000 to 8,000 wells by the use of electricity in competition with multiple cylinder gas engines with free or low cost gas, and steam engines, the fuel for which is not included or deducted from the allowable production of the well being pumped.

3. On some method of encouraging the greater use of electricity for drilling which has already been proven to be more economical than steam and is now just as flexible. Every drilling well represents an average load of 75,000 to 80,000 kw.-hr. per month.

4. On some method of attacking the oil heating problem of the pipeline companies, which has always been one of the chief obstacles in the way of greater use of electric motors for pumping. A low cost heating rate contingent on 100 per cent electrical pumping load in a particular station at current rates might be interesting.

5. On some method of convincing the refineries of the greater safety, lower maintenance cost and dependability of the electrical motor for pumping. The steam heating problem here is an important consideration and if allowed to get out of hand might encourage the refineries to make their own installation of isolated power plants.

6. On some method to keep the marine loading stations pumping with electricity. This is principally a matter of rate schedule application to a more or less isolated plant load.

7. On a much closer follow-up of those oil companies who already have electric drilling equipment on hand, by power company salesmen and manufacturers' salesmen in an effort to keep this equipment working a greater portion of the time.

Additional loads from the oil industry can only be obtained through the offering of power to that industry at a rate which is competitive with their own development costs.

The problem of developing such a rate must be solved.

If additional electric pumping load is to be secured, the electrical industry must institute research on methods of pumping oil electrically. This is our problem.

Agricultural Power:

1. Because most California rural territories are covered with line extensions that have been extended principally to develop irrigated load, it is now apparent that our future studies should be directed to the loading of existing facilities.

2. One of the major problems in connection with agricultural power which must be solved is to see that pumping consumers are fully informed of the need of securing considerable pumping equipment and the necessity of keeping this equipment in continuous efficient operating condition.

3. The solution must be found to the problem of financing of agricultural pumping plant rehabilitation. Is it necessary to have a finance plan that would take into consideration the seasonal income of the agricultural consumer?

4. The problem of convincing agricultural power users that the fuel bill for engine operation does not represent the entire cost of engine operation. A study of pumping costs as they affect total production costs.

5. The problem of retaining existing agricultural pumping loads under present power rates in the face of competition being offered by improved and relatively inexpensive internal combustion engines.

6. The problem of matching man power by the electrical industry with the sales forces of the various engine and gas companies which are attacking our business.

7. The problem of expressing the present type of agricultural power rate in order to eliminate present objections to minimum service charges?

8. The problem of developing a closer working relationship with pump manufacturers. Of inducing the manufacturers of pumping equipment to show more interest in the efficiency of their existing installations. Would expansion of pump-test-service increase kilowatt-hour use through better understanding and increased efficiency of equipment?

9. The problem of offsetting long-term financing being offered by engine and gas companies must be solved.

10. The problem of compiling more data with which to combat engine competition.

11. Study of existing irrigated crops. What additional irrigated crops could be introduced into any particular area?

12. Study of crops imported and exported. What imported crops should be eliminated?

13. What additional program should be used to acquaint farmers with decreasing water table and design of suitable pumping equipment?

Miscellaneous Agricultural Power:

1. In order to promote additional electric brooding, the problem of the development of suitable educational campaigns must be developed and a plan of closer cooperation between power companies and dealers of such equipment worked out.

2. The problem of securing smaller electric brooding installations involves the development of a suitable electric rate.

3. The further extension of electric service for agricultural uses involves the problem of coordinating interests outside of the electrical industry, such as farm advisors, soil analysis specialists, horticultural teachers, architects, farm loan boards, machinery and pumping manufacturers.

4. To satisfactorily promote additional electric brooding the problem of carrying on an advertising campaign in the leading poultry journals must be worked out. This is necessary in order to offset the activities of gas brooder manufacturers.

5. The problem of developing better methods for sterilizing must be solved.

6. Is soil heating receiving proper attention?

7. Can further agricultural electrification be accomplished by the Utility Companies establishing a demonstration farm for the purpose of proving up under operating conditions the various pieces of electrical apparatus being offered for farm use?

8. Can miscellaneous agricultural power use be increased if rates for such service be based upon transformer capacity rather than upon the connected load of the electrical equipment?

9. What possibilities are there for making use of existing pumping transformer capacity for off season uses such as heating, through a double-throw switch, etc.?

Retention of Existing Business:

For several years past the agricultural consumer has been in an unfavorable economic position due to falling commodity markets which resulted in electric service becoming an increased proportion of his production costs; consequently he has been very susceptible to the stories told by both scrupulous and unscrupulous salesmen of internal combustion engines. He has more or less been in the position of a drowning man grasping at straws.

Some solution of his problem must be found in the answers to the following questions:

1. Should this activity be classified as a special activity and handled by trained specialists?
2. Should special attention be given to accepting the responsibility of seeing that the consumer is utilizing purchased current in the most efficient manner?
3. Does the proper understanding of rate schedules affect this activity?
4. Should regular calls be made on existing consumers?
5. Do our large consumers know how their purchased energy is being consumed?
6. Should studies be made by the utility to point out how energy is being used and how it could be curtailed?
7. Do we have the confidence of plant management officials?
8. Does the sales organization of the utilities keep, assemble and use information on the operating cost of competitive power equipment?
9. Are general management policies and tendencies toward the installation of generating equipment discussed with consumers?
10. Are accepted policies on investments understood by utility salesmen?
11. Would simpler rate forms please our consumers, increase their confidence in us and get us more business?

Air Conditioning:

It must be recognized that the possibilities for increasing uses of electricity in commercial establishments lie mainly in lighting and air conditioning. The industry as a whole, so far, has talked air conditioning but has thought generally in terms of comfort cooling, overlooking the value of large commercial establishments of cleaning and filtering and the effect of clean air on merchandise on their shelves.

To accomplish increased sales for the above services, is it necessary to provide inducement rates, or can rate reductions be contemplated to be a fcator in the development of this business? The chief problem involved in air conditioning promotion consists of public education and in the creation of a wider recognition and acceptance of air conditioning. Can the advantages of these services best be called to the attention of the managers of commercial establishments by advertising or by more aggressive sales effort on the part of the utility, manufacturer, or distributor?

In other words, on whom must we depend to sell additional electrical services for these uses and by whom can the job best be done?

It is admitted, of course, that adequate wiring has a very definite influence on sales and some attention should be given to the question as to how we are to get more adequate wiring in both new buildings and old. Will more intensive work with architects, builders, building front designers, store fixture manufacturers, and heating and ventilating contractors help increase this load?

The problem of obtaining lower prices on air conditioning equipment must be solved.

How much of a factor is financing in securing more of this type of load and what measures should be taken to make purchases easier? The problem of developing reversed cycle refrigeration for heating as well as cooling should be considered by the power companies. The industry must consider the problems of establishing in each community a satisfactory air conditioning installation. The problem of developing a portable demonstration air conditioning unit must be solved.

In addition to the problem of educating the general public on the need for air conditioning and the problem of the development of such equipment at reasonable prices is also the problem of the development of satisfactory retail sales and service outlets.

Industrial Application:

The problem of electrifying many thousands of iron and brass foundry furnaces is awaiting a solution. How can industrial heating load be obtained where improvement of product and other advantages do not justify the difference between the cost of electricity and fuel. The problem consists largely of the development of new devices for applications where heat is needed.

The problem exists of keeping a potential user of industrial heating equipment advised as to the fullest developments in utilization equipment and to the further uses for which this equipment can be utilized in his plant. The securing of additional industrial heating loads presents a problem which is largely a competitive one with natural gas and oil fuels. If present non-electrified loads are to be converted, rates competitive with such fuels must be established.

Commercial Cooking:

The problem confronting the industry in obtaining more commercial cooking load is largely that of being prepared to meet competition with other fuels. A problem in commercial cooking load development lies in the preparation of advertising and educational campaigns directed towards bakeries, cafes, and similar industries stressing the advantage in the use of electricity in those industries.

In order to secure additional commercial cooking load, the problem of reducing both the cost of equipment and the rate for electric energy must be solved. In order to successfully acquire and retain commercial cooking load a solution to the problem of distribution and servicing of such equipment must be found.

Upon rereading this paper the writers have the feeling that about the only question which they have failed to ask is "How old is Ann?" We feel very much like the small boy who asks questions from breakfast until bedtime, but it must be borne in mind that the questions of the little boy represent a seeking for knowledge and in this respect we *are* such a little boy. Each of the questions above represents a point upon which we desire knowledge, upon which the industry as a whole must have knowledge before it can effectively increase its loads in these various fields. Do not therefore permit yourself to become awed by this torrent. There may be only one question in the entire paper which you may feel competent to answer and yet your suggestion on that one point may be the very solution for which we have been seeking. Study this paper, then, we urge you, and, promptly putting out of your mind those parts of it which do not concern you, concentrate your attention upon those in which you are interested that the industry may benefit by the suggestions which you have to offer.

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Discussion

INCLUDED among those who discussed the problem, "What are the most effective methods of increasing commercial, domestic and agricultural uses of electricity?" were Harry Fenton, Westinghouse Electric Supply Corp.; George Hawley, Southern California Edison Co.; G. R. Linderman, Incandescent Lamp Division, General Electric Co.; R. M. Alvord, General Electric Co.; J. C. Baker, Southern California Edison Co. and Carl Hardy, Chief of the Department of Electricity, Oakland. Pertinent extracts from their remarks follow:

Referring to new processes and industries, is it not true that practically all of the available additional outlets for large blocks of power are involved with the question of electric heating? We do not suggest that electric heat, in all cases, will compete with raw fuels. We will not be exactly competitive, but I want to point out to you that the factors which make electric heat competitive with other fuels are not inherent in the electric heat, but are inherent in the application. We know there is a tremendous reservoir of heating business; how far we are justified in going with allowances for off-peak schedules? How far ought we to go in our rate structures and general development program? Again, since a large part of this heating business has never before been electrified, how far are we justified in contributing to research to find the answers and to determine those factors in the new processes which will bring these un-electrified heating problems into the competitive field?

The problem of increasing the consumption of electricity is primarily one of educating present and future consumers as to the advantages of new and greater use of electricity. The best place to contact future consumers is in high school and college. The use of light as a medium of decoration, advertising, and structural design would be very interesting to students of art, architecture and advertising—to name only a few. The vital problem of proper lighting for the protection of the vision of future generations should be presented to the new generation so that they will not continue the harmful practices of the present.

The question is: How can all this information be given to students in our colleges and high schools in the most effective manner?

One other problem applies within the industry. It, too, is educational. One great help in selling better lighting, more power and heating is to have good examples of what you are selling to refer to which will prove your arguments.

Every person who is promoting the use of electricity should have complete information about every good installation or application of electric lighting or power in his particular line of selling. The question here is: By what means can this information be compiled.

Build for the Future on Good Public Relations

By DON C. RAY
Manager, Department of Public Relations, Pacific Gas and Electric Co.
and
A. E. HOLLOWAY
Vice-President, San Diego Consolidated Gas & Electric Co.

GOODWILL is the life blood of any business enterprise. It is a tangible something of which the component parts are the care and attention given to every detail which concerns contact with a customer—store location, quality of merchandise, quality of service, courtesy of employees, display methods, character of advertising—all of these and many more factors have an important bearing upon the degree of goodwill which is enjoyed, and neglect of any one small point may result in undoing all of the good which has been built up through the utmost care and attention to all the other details. No matter what business a man is engaged in, his success depends upon the goodwill of his customers.

One of the most important considerations in the matter of goodwill is the attitude of the employee toward the customer. Every employee at the moment that he or she is making contact with a customer is for *that* moment *the company*, in the eyes of the customer. It does not matter whether the contact is made by an executive, or one in the most humble capacity, an unfriendly attitude or one of indifference to the customer's needs or desires will destroy goodwill.

Resentment on the part of a customer, because of indifference, arrogance, superciliousness or brusqueness, is directed not toward the individual who has offended, but against the company by which that individual is employed. It is impossible to lay too much stress upon the importance of a proper attitude in customer contacts and one of the biggest problems of any business establishment, is that of building up and maintaining an envious record for courtesy and tact in its dealings with its customers.

The Problem:
What Are the Most Effective Methods of Increasing Customer Goodwill?

Industrial Relations

A closely related problem to the above is that which has to do with the attitude of the employee toward his company. Always in an institution with any great number of employees, there are bound to be a few dissatisfied recalcitrants whose very nature and temperament is such that they would complain of their lot, regardless of their position and compensation. The depression has, however, brought about a new problem resulting from conditions which have caused strained relations among employers and some of their oldest, most faithful employees. In many cases departments of specialized activities have been discontinued, yet rather than release the employees in those departments the companies have transferred them to other work. Often the new task is not so agreeable to the employee and frequently the remuneration received has been considerably lower.

Many employees who have been changed in this manner have failed to adjust themselves to their new circumstances. They have neglected to recognize the conditions which made this change necessary and instead of realizing and appreciating that the management was making an earnest effort to keep them upon the pay-rolls rather than letting them go completely, they have been resentful of the change and have sacrificed their loyalty upon the altar of this resentment. Without the loyalty of its employees, no company can now maintain successfully its customer good will. This particular problem then resolves itself into the question of "How can company employees best be made to realize that in almost every case a company has the best interests of its employees at heart and does not deliberately lower the position or remuneration of its workers?"

It seems to be so obvious that the welfare of employer and employee are closely interlaced that it is difficult to realize that this problem exists, but

these are most abnormal times in which we are living today and the problem does exist and must be solved for the mutual benefit of both. How then can we best reach a solution to this problem?

Another phase of public contact which is of vital concern in maintaining goodwill is the attitude of drivers of company cars. When an automobile or truck is identified by the name of a company, it is highly important that the driver be especially careful in extending the full courtesy of the road. Company cars should, for example, never occupy a parking space longer than is absolutely necessary. They should never assert themselves where the right of way is in dispute and they should be extremely cautious where pedestrians are involved. How can we best establish a set of rules governing the use of company cars and impress upon the drivers the importance of adhering to these rules at all times?

Speaking of rules brings up another problem in the matter of customer contacts. Rules laid down by the management are a most necessary guide to aid an employee in determining just how far he is authorized to go in meeting the request of a customer. However, when the customer wishes something which is not permitted, the rule which prohibits it should never be quoted as the reason for not complying with the customer's request. The quoting of rules presents an arbitrary attitude which is resented by all. A tactful employee will, instead of quoting rules, ascertain from his management the reason behind the establishment of the rule and in his dealings with the customer will present the reason and not the rule. Although all of us dislike being told that something we wish cannot be done it is "against the rules," any one of us will usually accept gracefully a logical explanation of why a thing cannot be done. The problem, therefore, is to determine the best means of impressing upon all employees the fact that the utmost tact must be used in denying requests for services of concessions which are contrary to company rules.

Credit and Collections

Collections of bills and especially over-due bills is one of a company's operations which may probably cause as much ill will from its customers as any other phase of its business. This is a serious problem with any business establishment and is particularly so in the case of utilities who may find it necessary to disconnect the services of a long over-due account. People purchasing merchandise under a lease-contract realize fully that failure to meet payments when due will result in the re-possession of their purchase, yet these same people are often bitterly resentful when faced with the likelihood of a discontinuance of their electric service if their bills are not paid.

Each utility has its own established collection plans and policies which have been arrived at through years of experience and yet it is felt that someone may have a suggestion to offer regarding the collection of bills and the method of handling disconnections when they become necessary which may solve the problem of how to handle these two necessary phases of business activity without arousing an unnecessary measure of ill feeling on the part of the customer.

Another vital point is the question of customer's credit when opening an account and also after using the service of the company for a number of years and having through some difficulty become in arrears for a short time. Close attention should be given to this question by the credit department so that the customer's goodwill may be continued.

The method of handling complaints is of vital importance to every business institution. Complaints should be welcomed because if properly received and dealt with, they can be made the means of building goodwill, whereas if the customer harbors an unexpressed resentment a great deal of harmful word-of-mouth advertising may result. How should complaints be dealt with? Should telephone complaints be given the same measure of attention as those made in a personal call at our places of business?

Speaking of telephone calls leads to another very important phase of customer contact. We must bear in mind that when dealing with a customer on the telephone the tone of voice and the service rendered are the only means available for creating a favorable impression. Should a standardized method of answering calls be adopted for use throughout a company? Or should each individual be permitted to answer a call in his own manner? If a standardized plan is adopted what greetings would create the most favorable impression upon the customer? If the information or service desired necessitates contact with several departments, should the employee first getting the call endeavor to complete the transaction for the customer and call back to submit a report or should the customer be transferred from one department to the next. In other words, what suggestions can be offered for a complete procedure in the handling of telephone calls?

All modern companies have adopted many and various service methods designed to improve relations with the public. How many of them let the public know of these methods and thereby secure maximum benefits from these constructive efforts? In the opinion of the writers the answer is, particularly in the utility field, relatively few. To what extent and by what means should the utility acquaint its public with service methods designed for consumer benefits?

One other activity which has a great deal of bearing upon customer goodwill is the work of the publicity and advertising departments. Every one admires a business concern which tries to advertise and sell its commodity to the very best advantage in competition with other commodities provided it uses proper business ethics in advancing its claims for competition. The publicity and advertising departments have a wonderful opportunity to build goodwill by promoting an appreciation of the wonderful benefits to be derived through the use of electrical service. Have our advertising departments taken full advantage of the opportunities which they have? Have the messages which they have prepared been designed to build goodwill to the highest degree? If you do not believe so, what type of program would you recommend that they undertake?

One element of goodwill building which has perhaps been somewhat neglected in the electrical industry has been that of creating a friendly attitude among competitors, and among the different branches of the industry. We understand that another paper deals with the problem of increasing cooperation within the industry and we will, therefore, not go into detail in this matter except to point out that the building up and maintaining of goodwill within the industry is not only as vital as is customer goodwill but it also has a very important bearing upon customer goodwill.

Rate Structures

One problem which is peculiar to the utilities is that of rate structures. No doubt the rate structures of the various utilities have been developed after years of study and research. They are probably correct in their present form but we find many customers who do not understand the reason for the application of different rate schedules.

Minimum bills have during the past two or three years given rise to many disputes between the companies and their industrial and agricultural customers. An unfriendly press has convinced many fair minded people that utility rates and profits are exorbitant

and that rates are inequably spread. What is the best method of combating this propaganda and correcting the misunderstanding so created? Is there some way of enlightening the customer on costs of distribution and service? Is it possible to simplify rate structures so that they may be more readily understood by the customer?

Public utilities, especially the power companies, are very much "on the spot" at the present time. There is no legitimate reason why this condition should exist. It is a result of a vicious and persistent attack throughout the country by a hostile press, actuated by motives that at best are questionable. Utilities are accused of almost every crime in the economic and moral calendar and are, by this press, accorded no credit for the constructive service they have rendered and are rendering. The power industry, by and large, has contributed its full share to the civic development of the communities it serves. Service has been constantly improved and refined; its affairs are ethically conducted; its charges for an improved service are constantly being decreased notwithstanding higher costs of labor and material; and its commodity is among the very few that is now served at prices below pre-war levels.

What method or methods should be adopted by the power industry to combat the false and misleading propaganda directed against it by the hostile press? Through what methods can the present misunderstanding, suspicion, and hostility on the part of the misinformed public be eliminated?

There are undoubtedly many other factors involved in the problem of improving customer goodwill than those which have been touched upon in this paper. However, it is believed that if those above presented could be worked out to a logical, practical solution, we will have accomplished the major part of our task and so we admonish the industry to give heed to these problems and submit the results of your thought, for an increase in customer goodwill is bound to bring with it an improvement in business conditions for the entire industry.

Discussion

INCLUDED among those who discussed the problem, "What are the most effective methods of increasing customer goodwill?" were Ralph Gage, Southern Sierras Power Co.; H. V. Busby, Southern California Edison Co.; H. A. Lemmon, Sierra Pacific Power Co.; Arthur E. Rowe, A. E. Rowe Co.; Henry Bosch, Pacific Gas and Electric Co. and Miss M. O'Mahoney, Pacific Gas and Electric Co. The discussion included the following points pertinent to the problem paper:

Assuming that we already have much valuable information that can be used by the rank and file of employees in creating better customer goodwill, how can we get this information disseminated? Another phase of the problem relates to the collection and correlation of useful information gathered by the rank and file of employees such as clerks, meter readers and others who make the majority of public contacts.

Goodwill will improve if some method can be developed for simply and clearly explaining how rates are arrived at and how they are applied.

Have employees been surrounded by so much of the story of the industry that they cannot appreciate the other man's viewpoint? Are all of us too impatient when the customer cannot understand what we are driving at?

The changing social order has given women an increasingly important part in business and they are an important factor in the success of any enterprise. This is particularly true of the electrical industry. After all, who is the most important customer? She is Mrs. Consumer. And who is in the best position to interpret Mrs. Consumer's problems? Some plan must be devised so that our women, who can speak a woman's language and get a woman's viewpoint, may do part of the goodwill job.

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Feature $2.75 Average Cooking Cost

Cooperative advertising of the Bureau of Power & Light, Los Angeles, this winter, will feature the low-cost operation of the electric range with the figure $2.75 prominently displayed. This figure of $2.75 has been arrived at as the average of over 3,000 domestic bills on the Bureau's system. The slogan carried will be "$2.75 per month operates the average electric range on Bureau of Power & Light's System." Advertising also features free wiring and carries this catchy line "When Boulder Dam Power Comes, You'll be Glad You Bought An Electric Range." Since all sales are made by dealers this will mean a stimulated market in this area.

A second series of advertisements will feature electric water heating at the new 1-cent rate. This latter advertising, playing up the safety of electric water heating, borders on the controversial type in its frankness concerning fumes and safety. Copy is prepared by the Dan B. Minor Co.

Problems Never So Important

THE PUBLIC buys what it wants! To substantiate this statement notice the patronage that is accorded theatres, football games, dog races, and other entertainment. Because of this fact our company believes that it would be a good gamble, even in the midst of a depression, to step out and spend from three to four times as much in promoting new business as it had in previous years. It is gratifying to know that the results obtained from these promotional efforts have justified the expenditures made in getting new business. Other companies which have been doing a similar job have found the public equally receptive to the idea of greater electrification.

However, building load is not the only problem of the utilities today as is shown by the papers of the Operating Economics Section. I was particularly impressed by the figures which show that for every kilowatt of peak demand on our systems we have approximately 4 kw. of transformer capacity in our transmission and distribution facilities. Likewise rather startling is the fact that for every kilowatt of generating capacity on a large interconnected system there is a kva. of condenser capacity. Cannot we find some way either of reducing the enormous investment behind the investment in generating capacity or of using the facilities more effectively?

The papers have indicated the multiplicity of problems that we face. So numerous and complex are they that the help of every person engaged in the business is needed to obtain the right answers and I want to encourage every member of the industry to share in their solutions. — F. B. Lewis, Vice-president and General Manager, Southern California Edison Co.

Cooperation Will Coordinate Business Building Efforts

By W. A. CYR
Associate Editor, Electrical West
and
H. L. HARPER
Pacific Coast Manager Graybar Electric Co., Inc.

CAPABLE navigators lay their course with a full knowledge of the hazards of the sea lanes, plotted carefully for them and made up in the form of a chart or map. Capable engineers investigate the strength of the materials out of which their works are to be constructed. So it must be with the planning of cooperation within the electrical industry. Only the visionary variety would be foolish enough to plan first and find out afterward that his course led him to wreckage, or that his materials were never meant to stand the strains which his design has placed upon them. And yet, too often cooperation has not been planned with a firm and comprehensive appreciation of the forces it must withstand, and the materials out of which it must be fabricated.

It is the purpose, in this paper, merely to sound for the subterranean shoals and to plot them on a chart of guidance to cooperative effort. Such soundings, such analysis, must first of all be realistic. It will serve no end but dissillusion, and final disaster, to ignore or refuse to treat with facts which exist and which have a bearing upon cooperative effort, whether one likes them or not. The intelligent course to pursue is that of full enlightenment. The successful course will be that which is laid with a full realization of the hazards and weaknesses of joint activities which have as their aim the harmonious working of many persons toward a common purpose.

The Materials

Perhaps the best place to begin a study of cooperation within the electrical industry is with the word "cooperation" itself. Certainly it needs definition—perhaps only redefinition. At least there seems to be required a clear-cut understanding of its meaning, its significance and its responsibilities. As words will do, this term has become shopworn. It has been so taken for granted, so neglected in what it implies, in its fullest sense, that it has ceased to have any meaning whatsoever to a great many people within the industry. And to others, dissillusioned by the failure of some former cooperative effort, there has been given to the word a flavor and cynical meaning which is disreputable, and unfortunate.

The Problem:
What Are the Most Effective Methods of Increasing Cooperation Within the Industry?

Clear-cut definition, therefore, should be the beginning of any consideration of cooperative effort.

Next, it is important to appreciate that cooperation must take place between and with human beings. Perhaps the true analyst would place the very root of the entire problem right here. It is known to scientific investigators that no two individuals are precisely alike. Each has his own chemistry, his own finger prints, thoughts, repressed desires, glands; and has been brought up in an environment which is never exactly like that of any other individual. These factors contribute to the manner in which each individual reacts to any given set of circumstances. It is because of these factors that no two people have precisely the same viewpoint as to such a seemingly obvious quality as "honesty." What is "playing the game squarely" to one man is as crooked as a dog's hind leg to another whose training, and chemistry, is different.

Cooperation implies a measure of seeing eye-to-eye, a mutuality of interest, a subordination of some of the privileges and rights of ruthless individualism to a common purpose. Such a requirement calls for personal sacrifice. It requires a subordination of *immediate* self-interest to the larger *ultimate* self-interest of the entire group or industry. Such sacrifice calls for a training and discipline without which cooperation has not so far succeeded.

The basic problems of cooperation cannot be treated with any degree of penetration without a willingness to include in any prospective cooperative program, whatever it may be, a plan and method for promoting such education, such training and discipline.

The Application

With these fundamental considerations well in mind the problems of cooperation branch out into some of the intricate industry ramifications. With some of these more apparent problems, you are all more or less familiar. For purposes of clear thinking it will be well to consider each of the many and varied branches of the industry separately.

Utilities

First, because from their operations comes the source of energy around which the industry is built, there are the utilities supplying electric service. Within the individual utility, with its own wide range of occupational and personal interests, there are conflicting view-points which often afflict cooperative effort. While it is presumed that all members of one corporate entity, such as a corporation or a utility organization, reflect only the policies and purposes avowed to be those of their company, this is never a fact. Ol' Debbil Human Nature again! For example, the background of training of an accountant, and an engineer, a lawyer, and a salesman is different. His view of his responsibility to his company is also taken from a different perspective.

This may not appear to affect cooperation between other branches of the industry, but it is a very vital factor. The work of the sales department, for instance, in the coordination of its staff to those of the other groups in the industry for a cooperative purpose, may well be nullified by an attitude or an unsympathetic action on the part of the engineering department, the accounting department, the legal department, the purchasing department or the management. A self satisfied junior executive, with a conscientious, but near-sighted, view of what he thinks is best for his company may commit an error, in itself trivial, which will find its ultimate reaction months later when a salesman or a dealer-contact representative calls upon a contractor-dealer to seek his

participation in a cooperative campaign. The well-meaning effort of an engineer in seeking to lower the cost of wiring for his company's range services in order to increase load and make ranges easier to sell, may have its repercussions in a political campaign three years later.

These are problems of internal education and coordination. Seemingly they have little bearing on cooperation in the industry, but. actually they are like submerged shoals, too often uncharted, upon which the ship can go aground.

Breaking down still further, there are the problems arising out of the actual operations of the sales department of the utility. These start with the attitude of the executive in charge and run all the way through to the lone salesman, out punching doorbells, sometimes desperate for the sale and hazarding everything else to its consumation.

The executive's attitude toward cooperation can be either that the trade is a nuisance that must be borne in proud fortitude, or it can be that within the trade are many potential and useful allies. The nuisance attitude has the unhappy faculty of filtering through the entire sales staff, even to the management of the utility. When it does, no amount of lip-service to cooperation is convincing to the remainder of the industry, and that so-called "cooperation," half-hearted, is doomed before it begins.

The ally attitude, on the other hand, must be fortified by broad tolerance, and a brave heart not easily broken by the disappointments which human nature in the raw can bring to it.

Pressure from "Upstairs" upon the sales department to prove the value of the sales expenditures by tangible evidence of load-building, while it is the stimulus to cooperative effort and often the means whereby such effort can be financed, sometimes places difficult strains upon the actual operations of that cooperation. Where the pressure is too great the sales department often errs by haste, sacrificing some of the more intangible long-pull benefits for more immediate results.

A by-product of this is the handling and paying of salesmen. Unfortunately, the carrot held out in front of the salesman's nose to stimulate his eager and fervid salesmanship, makes him myopic. As a result he can run into more other people's rights than anyone has any idea. Where a salesman, by an urgent biological demand to gain food and livelihood for himself and family, is placed in a highly competitive position with the dealers of a community, he can only be a half-hearted cooperator himself, and as such beget no more than half-hearted cooperation from the dealers, if not actual distrust and sometimes hate. And, once again human nature asserting itself, that ill-feeling is, justly or unjustly, directed against the company, not the salesman.

A multitude of details, and how these are handled, either contribute to or detract from harmonious cooperation. These include price of merchandise, type and kind selected to be featured, terms offered, financing plans, trade-ins on old merchandise, second-hand or damaged merchandise disposal, wiring arrangements selling methods, advertising claims, etc.

Still another very important factor is the question of utility rate structures. The many and varying rate schedules, their interpretation and application, have long been as much of a source of wonderment and confusion to many in the Electrical Industry as they have to the average lay-man on the street. The fact that the charge of high electrical rates is frequently made by electrical men, would indicate that rate simplification would add materially in eliminating a frequent source of inharmony.

It may be noted that these are listed here as details, and given small importance in the analysis of the problems of cooperation. Often these details loom as the entire problem, yet perhaps it is truer to reality that in the controversies between branches of the industry the battleground may be in this zone of details, and the weapons of battle may be charges and countercharges over these disputed details, but the real forces at play are more fundamental.

Finally, one of the great obstacles to cooperation, sometimes completely unrealized by utility people, is the very size and importance of the utility itself. When a proud (perhaps justifiably so) attitude is assumed, the reaction to it from other groups in the industry is a fear of intimidation, a suspicion of domination or a sense of paternalism, any one of which is repugnant to the free spirit of an American. To the American the definition of cooperation somehow must encompass the thought that such activity must be conducted as between equals. If he feels that he is not an equal, then to obtain his cooperation the scale must be balanced so as to make him feel so.

The other branches of the industry look to the utilities for leadership in cooperative programs and they also look to the utilities for a substantial part of the financial support which such programs require. The California utilities have met this challenge and have for years furnished both the leadership and the financial support which the industry has desired. Unfortunately however, it must be admitted that they do not enjoy the full measure of goodwill which such a measure of cooperation would be expected to bring to them. Why?

Is this critical attitude due to any lack of appreciation of the part which the utilities have played in building up the industry? We believe not. Frequently a utility executive will become righteously indignant and express the belief that the other branches of the industry continually look to the utilities for understanding and help, but do not, on their part, attempt to understand the utilities problems or aid in their solution. We do not believe that such is actually the case. We feel that it would be more nearly correct to state that the utilitie's efforts are fully appreciated and great measures of goodwill have been built up only to be greatly diminished periodically through some ill-advised word or misguided activity such as above mentioned.

Goodwill is very like a garden; its seeds cannot be planted and abandoned if they are to grow to maturity. Cooperative effort is but the sowing of the seed. The care necessary to bring it to flower consists of frequent contact with those in the other branches, the development of close, personal friendships, and the execution of plans in accordance with established policies. This last point is particularly important because it is so frequently abused. The policies of a utility in any given situation might be entirely in harmony with the spirit of industry cooperation and yet the actual field practice of a salesman, or in some cases even a district manager, may be so contrary to that policy that it will stir up endless ill-will and destroy much of the confidence and goodwill which has been building for years.

The Manufacturers

Practically, every manufacturer is in business to make money by selling his product. Theoretically also any program of cooperation which will produce that result should serve the self interest of every manufacturer. Actually there are a great many detours on this straight line which would be the shortest distance between two points. Since, in dealing with cooperation, we are dealing chiefly with the end-product of distribution, the hazards to that cooperation spring from many deep-rooted manufacturer policies and methods.

Sometimes the manufacturer, instead of welcoming advice as to improvements in his distribution methods, advice which springs from actual field experience and difficulties resents it as interfering with his prerogatives. As the maker of

a product he feels that his is the disposition of it as he sees fit.

In this instance we are concerned only with such policies and methods as they affect cooperation within the industry, yet it is a corollary to this problem that much of the entire problem of distribution of manufactured goods hinges on this attitude. It is conceivable, for instance, that a cooperative effort between manufacturers could develop a far more complete and accelerated distribution of all products. Until last year much of such cooperation was prohibited by anti-trust laws. Under NRA code operation it is to be hoped that this cooperative spirit develops, for with such head-office cooperation in distribution policy and method, many of the problems which arise out on the firing line of selling will have been solved at the source.

One of the most potent and negating difficulties besetting cooperation in the West lies in the fact that resident executives or agents representing Eastern manufacturers are not clothed with enough responsibility for autonomous activity. They frequently are not able to commit their companies, not even their western branches, to a program which they may themselves feel is important and beneficial. Because of time and distance and a lack of intimate appreciation of Western field conditions, their enthusiasm-laden pleas to the home office for permission to participate get lost in the files or wear out bouncing back and forth across the continent before approval is obtained.

Distribution method plays a far more important role in affecting cooperation than first realized. One manufacturer will distribute his product direct to large retail outlets. Another will distribute through wholesalers to the dealer. Another will make a special brand of appliance, identical to his own product, which he sells to a great chain and mail order house to sell at prices lower than his retail price for the product bearing his product name.

The first remains on the basis of a strictly price negotiation, and the manufacturer usually assumes no part of the marketing responsibility, other than national advertising. It is presumed that the lower price and longer margin to the dealer will enable him to finance anything he feels like doing in that respect.

The second type brings the manufacturer more closely into the cooperative picture with the distribution of his product through his agent, a wholesaler or distributor. In some instances an even closer relation is retained in that the wholesaler establishment is owned by the manufacturer. Yet such organizations are schooled in an internal cooperation which gives them experience and a favorable attitude toward a cooperative program for the entire industry or any group in it.

The third type of manufacturer evidently plays both ends against the middle, sometimes perhaps a profitable operation to him, but devastating in its effect upon the amicability of the trade. The very helplessness of the wholesaler and dealer to cope with this powerful and effective competition forms an emotional resistance and backwash that seriously retards any wholehearted expression in a cooperative program.

Those manufacturers who have adequate distribution outlets in the Western Region are one thing, and those who are anxious to extend their distribution into this territory and as yet have no satisfactory outlets, present another serious obstacle to cooperation. Methods which would not be resorted to in another area in which these manufacturers enjoy adequate distribution, are sometimes employed to force a path into this market. Into this situation may be entered many troublesome details of operation, such as turnover of local stocks; methods of compensating salesmen or agents, the pressure placed upon them, the limited latitude allowed them to fit the product into prevailing methods of distribution by orderly, patient means.

Such outlaw influences damage cooperation by taking business away from those who do cooperate, thus giving rise to the emotional and unreasoned conclusion that cooperation handicaps rather than assists a firm to get business. While those who are ethical do the cooperative work which maintains an "umbrella" of trade-protection and goodwill over the business, the "chiseler" cuts in, harvests the fruits of cooperative effort without having contributed a moment of time, a dollar of expense, or in fact anything.

Such piratical methods are not confined in their effect only to competing manufacturers. The results of such practice breaks down cooperative effort between wholesalers, between contractors, between dealers and between each of these groups in their mutual relations. It replaces faith, without which cooperation is hobbled, with a cynical and negative frame of mind toward joint effort.

The Wholesalers

Next in line of distribution is the wholesaler or distributor. Of this group there are several kinds, chiefly known as (1) manufacturer owned and operated, and (2) independent, who select the wares they wish to handle from among many manufacturers. Since wholesalers, in handling the product of a manufacturer are guided as to its resale policy to a certain extent by the manufacturer, many of the problems affecting the wholesaler in a cooperative program spring from the manufacturer problems. Added to these are some purely regional and local conditions.

One such peculiar twist to cooperation has existed for a number of years in distribution. At least in the West, there has been a rather sharp cleavage between two groups of wholesalers. One group of wholesalers, has cooperated excellently on a horizontal plane, between its own wholesaler members. The other, has given its chief cooperation not to its own competitors, but vertically, to its customers, industrials, and the contractors and dealers, some of whom may owe them money or form a major outlet for their own wares. Of late, efforts to bring these two groups together have been more successful.

Another source of worry to the electrical wholesaler and an influence which cramps his cooperative style, is his cousin the wholesaler of hardware, of drugs, of machinery or of home furnishings. Electrical supplies and appliances are widely sold or used by the customers of these other types of wholesaler. Each is anxious to enlarge his market. Some, because of especially favorable buys, are in position to offer merchandise at prices that the farsighted and ethical wholesaler does not see fit to meet. Usually outside the cooperative circle encompassed by any of this industry's activities, these wholesalers and distributors have no compunction in disrupting the relations of their electrical competitors. Efforts to encompass these related fields in cooperative work in the electrical field have so far proved discouraging, except in the appliance field, in some localities. Some hope of relief from the raids of such wholesalers into the sheltered cooperative fields of the electrical wholesalers lies in the successful operation of the NRA codes of fair practice and a better understanding.

Mail order and large retail chain store organizations, for some of the same reasons already enumerated, and many more, are a perpetual harrassing influence to both wholesaler and contractor or even dealer cooperation. Buying direct from large manufacturers who, for the volume and the excellent credit of the large chain store organization, make concessions in price, either directly upon the wares or otherwise sold to the trade, or on special brands of the same materials, these chains sell direct to the consumer. They eliminate the wholesaler and still do not take the wholesale profit. The result is that the consumer is frequently able to buy

direct from them at prices which sometimes equal those paid by the trade for the same items. By concentrating on the mass production items they remove from competing outlets their most profitable items. The manufacturer and wholesaler who must stand the brunt of pioneering effort in the bringing forth of new products and improved devices is thus deprived of a well-merited profit on the already established mass produced items.

Efforts to obtain almost any kind of cooperation from such organizations, even along lines which will increase their own sales, are stymied by the complete lack of responsibility placed in the local managements of these organizations. Like the "heathen Chinese," none of the local managers "sabbee" when it comes to exchange of statistics, participation in an appliance campaign, or any other industry activity. This completely neutral attitude from one of the most vigorous and dominant sales outlets in the economic picture forms one of the most depressing influences upon cooperation.

The Contractors

The electrical contractor's problem differs from that of the other branches of the industry in that his business is influenced in such a very large degree by conditions over which he has absolutely no control. Insofar as the program resulting from unethical competition of the so-called curbstoners is concerned, he can establish his own policies. These may not always be decided upon with the best interests of the industry as a whole being given very much consideration, but at least the decision is his own and he stands or falls by it. Aside from this angle of his business, however, there is a very ponderous problem of endeavoring to conduct his affairs with some semblance of intelligent planning, even though he is so seriously affected by the changing policies of the other branches of the industry over which he has absolutely no control, in which he has no voice, and of which he has no fore-knowledge.

To survive, if he does (and somehow he lands, like a cat, back on his feet, and has as many business lives) he has had to pit his wits against the entire industry. He has had to guard against the manufacturer who is too anxious for business and often completely ignores his established outlets. He has had to offset the efforts of the wholesaler who has sold direct to his customers. He has had to protect his own interests against the utility, which wants him to cut his costs and approved methods of installation in order that more energy can be sold. He has had to watch architects who would chisel him to impress their clients. General contractors, he has sometimes found, add up the total of subcontractors bids, cut that total 25 per cent, and then try to recover some profit for themselves by driving subcontractors to bankruptcy through giving away their work. He has had to watch laws and ordinances, bargain with union labor, watch his own men to see that they do 6 hours work on a six hour day. He has had to compete with the householder's bright high school lad who buys supplies from the 5 & 10 cent store and installs it himself.

It is not any wonder that when he is approached with a broad and unspecific cooperative program, which does not set forth in clear specifications just what he is going to derive from the effort, that he gives it a meaningful "oh yeah?" He is very realistic about his cooperation, and like the Greeks, has a word for it when it does not meet his hard-boiled test. If there are few representatives of that group here in this meeting today, it is because the broad and altruistic cooperative program of the past have left them unconvinced and skeptical.

Much blame has been heaped upon the contractor for many of the evils of the industry and doubtless some of this blame has been properly placed, although many of the practices for which he has been condemned have been patterned after similar practices of the other branches of the industry.

In any event, the fact which must be faced is that the problems of the industry are not to be solved by heaping condemnation upon the contractor's shoulders. His problems are a closely interwoven part of those of the entire industry, and the real solution to the general problem will be reached only through taking his problems into consideration and helping him to solve them.

The Dealer

Not long ago, contractors and dealers were one and the same, but only in small towns and to a limited degree in larger centers is this still true. Today every kind of store handles electrical appliances and fittings. This materially complicates the problem of cooperation because there is in this heterogeneous group very little of what might be termed "industry consciousness." In other words, the retail dealer is not conscious that he is a part of the electrical industry, and what is more he apparently doesn't care.

On matters of policy, efforts to obtain cooperation among retail dealers has run into all of the end-results of the distribution policies of all of the preceding groups—manufacturers, wholesalers and distributors. These so complicate the situation that agreement and adherence to any agreed policies is not to be expected for some time to come. The retail code of NRA ran into this diverse and complex problem, and deferred it until the fundamentals of hours and wages were first accomplished.

On a cooperative sales campaign, however, dealers are quick to take advantage of a well balanced and efficiently operated promotional plan.

Conclusion

We believe that the true solutions to the problem will be found in (1) a plan to promote an honest, fair dealing attitude toward the competitors within each branch of the industry; (2) a plan to unite the several branches of the industry in an understanding of each other's problems so that policies may be established upon the basis of the greatest ultimate welfare of the industry as a whole; (3) promotional plans in which all may and shall participate wholeheartedly, each trusting the others honesty of purpose so that the industry will present a united front in its effort to obtain that greater share of the consumer's dollar, which the value of its service and its contribution to public welfare merits.

Discussion

RELEVANT discussion of the problem, "What are the most effective methods of creating cooperation within the industry?" was presented by J. O. Case, Quality Electric Co.; C. L. Chamblin, California Electrical Construction Co. and Bruce Brownley, Westinghouse Electric Supply Corp. Extracts from their remarks follow:

One of the outstanding problems is how the industry can organize to get the other fellow's point of view. Complete cooperation will not be attained unless there is tolerance and a willingness to listen to the other fellow's story.

Representatives of other branches of the industry will no doubt speak for their divisions, but the problem is so inter-related that in its final analysis it must be considered as a problem of the whole. From the viewpoint of the electrical contractor, while he is, or should be, the final point of contact between the industry and the consuming public, and therefore an indispensable link in the electrical chain, he has been more or less regarded as the poor relation and expected to content himself with what crumbs may fall from the table of the other branches of the industry. Probably the contractor himself is largely responsible for this evaluation and to some extent the correction of this condition is in his own hands.

+ + + by Electra's Husband

Aint There No Santa Claus?

We Know Pretty Well There Isn't Much Justice in the Administrations Policy of Spanking Us With the Flat Side of That 30-in. Yardstick

I SOMETIMES wonder if the electrical industry has forgotten about Santa Claus. Now that it has outgrown its rompers, possibly the industry has become cynical, as is the custom of sophisticated youth. Conceivably, the industry having put up with a few hard knocks, is saying, "There ain't no Santa Claus." Perhaps, having been told in no uncertain terms that we are bad, very bad boys, we have given up hope that there will be any Christmas worth cheering up for this year.

Such a stubborn position is evidence of blind partisanship. On every side we have abundant evidence that there *is* a Santa Claus. Not over a month ago he visited every state except Maine, where elections are held in September. Especially notable was the visit to Pennsylvania where candy was distributed with a lavish hand. California was not overlooked although the self appointed spokesman and messenger to Santa Claus was diplomatically sidetracked.

Of course the trouble out in the land of Prunes and Nuts may have been that the messenger tried to wear the old man's whiskers and take orders for toys for future delivery. The folks seem to have discovered in time that he was only one of those Salvation Army santa's with a kettle instead of a bag full of gifts.

Yes, there is a Santa Claus and if the electrical industry does not sense his reality it may be due to a lack of sympathetic understanding between the industry and the old gentleman. To warrant the favors of Kris Kringle one must have a good record or at least show good intentions. At present the industry is unable, or unwilling, to write a letter to Santa Claus. Such a letter should be somewhat as follows:

> *Dear Santa:* I want some toys like the other boys have been getting. It's a long time since I have had a present. I remember what you said about the yardstick and I et my spinach.
>
> Your loving friend,
> *Private Plant.*

The engineers amongst us seem to favor our chipping in to buy Santa a present, instead of asking any favors just now when he shows such a peeve. These engineers figure that we ought to get him a slide rule to do his figuring with. He seems to have been using that rubber yardstick of his to multiply with and the answers he gets look like some of the Popeye dolls he makes—you know, all head, and no body.

After all, Santa has always just made toys to play with. You wind them up and they run fine until day after Christmas and then the spring breaks. In this case the spring may dry up, or the bank roll break, if the working and earning taxpayer doesn't break first. Still it might be well to write a letter anyway.

These are practical times and we must take a practical view of things. The banks wrote a letter to Santa Claus and they got results. So did the oil industry. And so did A & P. Likewise the Stock Exchange. About the only individual who seemingly doesn't give a rap about Santa Claus is Henry Ford.

Now that Santa Claus has shaved, we discover that his twinkling eyes are supplemented by a very stern chin which seems to say, "If you want anything from me you've got to play ball." This is a shock but we will have to take it. Of course we all know that Santa Claus is not exactly what he seems. "He's your father" playing a part. In the case under review, he is the taxpayer and as long as Dad is willing to shell out we cannot blame the recipients for taking all they can get.

When Dad begins to feel the pressure he may decide that something is wrong with the Santa Claus system and set about to modify it without too greatly disturbing the charming faith of his children. I have a hunch that such is the view of the electrical industry and that, rather than eat the spinach, it would like to persuade Santa Claus to be less generous with the sycophants and to spread his favors with less discrimination.

Actually, the electrical industry does not ask for a new doll—it would be quite content with the one it has if only Santa Claus' delegated mischief-makers would stop pulling the stuffing out of it. What hurts is to see brand new dolls distributed to those who, in the opinion of the industry, do not deserve to have them. It may be a New Deal but it doesn't seem like a square deal.

Well, Christmas will soon be here. The industry may be tempted to quote Andy Gump, "It may be Christmas to some folks but it's just Tuesday to me." It's getting pretty late to write a letter. Maybe it would be better to postpone it until next year. Santa Claus will be looking around then with the idea of getting a general endorsement of his policies. Right now most of his boys and girls would give him the Grand O.K.

Lots of things can happen in a year and, while we bear the Old Gentleman no ill will, we have a lot at stake and he should be willing to pardon us if we do our damnedest to hang on to our doll. Really it means a lot to us, including employees, stockholders, savings bank depositors and holders of insurance policies. When they all get the same slant on Santa Claus that the management of the industry seems to have, it is barely possible that he will discover that, in his anxiety to provide a more abundant life for the unfortunates, he has done an injustice to a great group of square shooting kids who want to believe in him but have been abliged, through painful evidence to question his unbiased consideration for *all* of his children.

If he can be so persuaded, won't we have a bully Christmas next year?

Bill Jones Speaks + + +

There Are Only Seven Strings —

THE Sales Manager was absent; en route to the convention, accompanied by a bag of golf clubs and the memory of definite instructions from the Manager to the effect that he was supposed actually to attend at least one of the sessions, followed by a pointed hint that there is a positive limit to the flexibility of expense accounts. The Manager himself was lunching with the Directors of the Chamber of Commerce, who were spending some hours in earnest discussion of a proposed resolution to be wired to their representatives in Washington. None of them knew what it was about, but each member insisted upon recording that fact at great length.

Save two, the salesmen were all out, ostensibly improving the company's public relations by consuming a very good free lunch involuntarily provided by an important customer. Bill Jones appeared to be a bit disappointed as he listened a moment to the desultory byplay between the cashier and an agitated customer who couldn't understand why her bill was $1.80 more this month than it was last month despite the fact that the whole family had been away and the house closed for over three weeks. One of the two remaining salesmen suddenly disappeared, but Bill cornered the last one.

"Listen!" he said in his best Ancient Mariner manner, "We are very likely to think of the human mind as a superdelicate, intricate contrivance, full of surprises and unexpected depths. Actually the human mind (of course the other fellow's), is just a bit more complicated than a grindstone and quite a lot less so than a ball bearing mower. As evidence of the simplicity of this thing—the pitiable simplicity—of what we call the mind, I offer my own for your consideration.

"The mind is so restricted in its operations that it isn't capable of originating a single, solitary thought—probably never has. So simple is it that there are but seven things that will make it work at all, and whatever we do, whether it be to lead the dear, delightful, confused old lady across the street to a place of safety, or whether we drag her into an alley and cut her throat, is due to one of the seven. They are: *Desire, Fear, Hope, Love, Joy, Grief* and *Hatred.*

"It may not have anything to do with my subject, if I have one, but of the millions and millions of operas and dramas and tales and poems, etc., which have been enacted and related and written for all time past, or will be in the future, there are but seven possible plots for them all. In the relation of man to all the rest of mankind, it is said there are but thirty-six possible situations. We are marionettes from which dangle seven strings. Pull one of them and we kiss the cook; pull another and we assist the unfortunate, and when one after another we have pulled them all, we have absolutely exhausted our emotional repertoire.

"That strips the human mind of any false pretense it may have made of being an independent creative motor, doesn't it? But what interests us is that it greatly simplifies our problem of guessing how the other fellow will react to our promotional effort.

"No sale of anything under any circumstances can possibly be accomplished until something has tugged at one or more of these strings. The clever salesman selects the one which his knowledge and study of the subject leads him to believe will turn the trick, both to the advantage of himself and the prospective customer, and the whole thing is just as easy as falling down stairs.

"Some corn-fed philosopher rises to remark that mere man never knows much about how a woman's mind works until it is entirely too late to do him any good, and I find that this is a prevalent impression, especially among married men. Nothing so pleases or flatters the lady of your choice as to be deemed a dark, inscrutable mystery whom no one can understand, much less her husband, and personally I think it is just as well to let them believe that. Actually a woman's mind is just about as opaque as a perfectly clean, well polished bit of plate glass, and we are going to see how easy it is to put her through her paces.

"When she steps into the dining room to answer the telephone, we stick a nice, new, shiny pin into her baby who is playing on the kitchen floor. 'Aha', you chuckle, 'the brat will squawk'. Good, you have anticipated a mental reaction in that baby. The mother comes in and catches us at it. Why, she seems annoyed, doesn't she? Gorgeous! We are making marvelous progress, for again we have made an unerring estimate of the mental state of the second person. In fact, we have become sure shot psychologists. Now, isn't that perfectly simple, or is it just simple?

"Being a mother, she is of course hasty, illogical and unreasonable, grabs up a chair, a poker, a flat iron and a broom. Why, why does she do these things? She doesn't seem to love us any more; and no sooner have we made our escape than she has that youngster cuddled up in her arms, laughing, crying, cooing, fussing over it just as if it amounted to something. She does love her baby. Later on when we have time for reflection, we will make our batting average 1000 if we arrive at the conclusion that she loves her own baby more than she loves other people's.

"And so we see how in thirty seconds of time, with no apparatus whatsoever but a small pin and a borrowed baby, we have pulled every one of these seven strings—*Desire, Fear, Hope, Joy, Love, Grief* and *Hatred.* Who says Psychology is not an exact science?

"The knowledge that certain circumstances under our control produced positive results in her brain, which to that extent was certainly also under our control, constitutes a working knowledge of fundamental human nature. To create and direct these circumstances spells *Salesmanship.*

"However, there are said to be ways of selling ideas to young mothers which . . ."

But the salesman had escaped—whether to sell bottle warmers to young mothers or just to his own lunch, Bill never knew.

Advantages of the Forced-Air Electric Brooder

By J. C. SCOTT
Agricultural Engineer
Puget Sound Power & Light Co.

THE new "Forced Air Draft" electric brooder, developed by the Puget Sound Power & Light Co., cooperating with the Western Washington Experiment Station, has proven by the experience of many poultrymen of western Washington to have several advantages over any other brooder ever developed.

A large number of these brooders in operation during the past season indicates that the consumption required to brood a chick has been reduced from the old average of 1 kw.-hr. per chick per season to ½ kw-hr. per chick per season. In fact it required only ¼ kw.-hr. per chick per season in some cases, while several poultrymen achieved results of 1/3 kw.-hr. per chick per season.

However, cutting down the current consumption is of little importance in comparison to the advantages this brooder has in producing stronger, healthier chicks. As indicated by its name, the brooder furnishes plenty of fresh, warm air to the chicks. A motor driven fan in the top of the brooder forces a gentle but constant flow of warmed air over the chicks' backs and out under the curtained sides of the brooder.

Although there are two heating coils in the top of the brooder through which the air is forced, only one is connected to a thermostat to control the temperature, while the other, being on at all times, prevents the chicks from being subjected to cold drafts. This heating element which is permanently connected is 150 watts, and the other, which works on a thermostat, is 1,050 watts.

It requires a tremendous amount of painstaking work on the part of Glen Cushing of the Puget Sound Power & Light Co., and H. F. Rau (who now manufactures the brooder), to get a constant, even flow of air in all parts of the brooder, and also an equal distribution of temperature in all parts of the brooder, but this important feature of the brooder has been very successfully worked out.

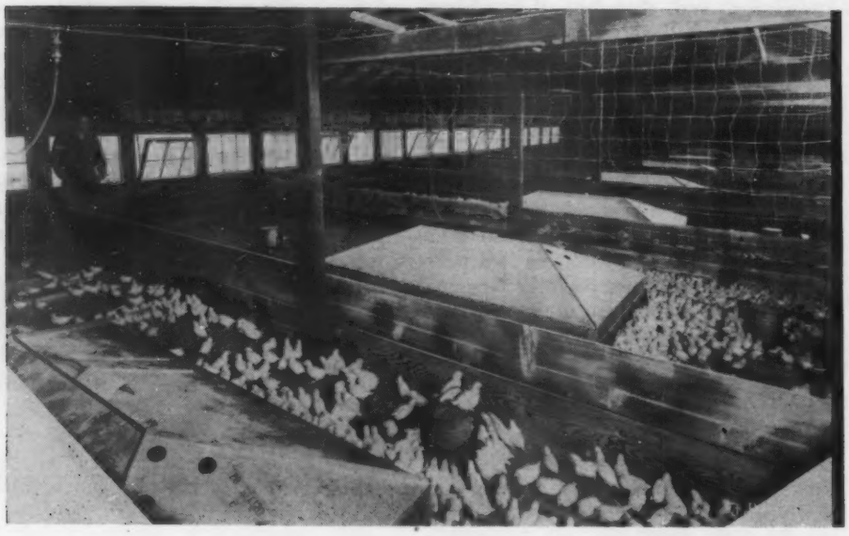
Success of the brooder depends upon these details being correct. The proper diffusion of the air currents and equal distribution of temperatures in the brooder was accomplished by means of a properly placed baffle in the top of the brooder, just under the fan. This baffle also acts as an automatic damper, which closes the opening in the top of the brooder at any time the fan should stop. The brooder being well insulated and the automatic operation of the damper preventing loss of warmed air, makes it possible for the chicks to remain in comfort for several hours in case of current interruption. Another feature of this brooder is that the warm air current keeps the floor comparatively dry.

The accompanying picture was taken on T. Hovila's poultry farm at Winlock, Wash., where he operated ten of these brooders during the entire brooding season of 1934. Each of the brooders had a capacity of 1,000 chicks. In 1933 Mr. Hovila operated two coal brooders and one forced air draft electric brooder, side by side. He reports that cannibalism among the chicks in the coal brooder was not only prevalent but the hens from this flock continued the practice of cannibalism in the laying house. However, he says that he had absolutely no cannibalism at any time among the chicks, the pullets or the hens from the flocks brooded in forced air draft electric brooders.

Mr. Hovila states that to keep chicks and hens from practicing cannibalism, it is necessary to see that the brooder house and the laying house are kept cool. He recommends fresh air and lots of it, and no supplementary heat in the brooder house.

This brooder is ample to take care of chicks in any weather encountered during the brooding season in the Northwest.

As a result of the chicks working in a cool room, and being able to go into a warm hover supplied with plenty of fresh, warm air at any time, it was possible for poultrymen using these brooders, to develop chicks sufficiently feathered, husky and strong enough to be taken out of the brooder and perched, at from three to five weeks of age. During the 1934 season, Mr. Hovila took all of the many thousands of chicks that he brooded, away from the brooder not later than three weeks of age.



Forced air draft electric brooder developed by Puget Sound Power & Light Co. in cooperation with the Western Washington Experiment Station at Puyallup and H. F. Rau (manufacturers of the brooder) in operation on the T. Hovila farm, near Winlock, Wash. Ten of these brooders were in operation on the Hovila farm during the entire 1934 brooding season.

Electro-Steam Boiler Builds Load for Pepco

POSSESSING desirable load characteristics and at the same time performing a needed service for the dairyman, the electro-steam boiler is finding wide adaptability in the territory of the Portland General Electric Co. Data collected by the company indicates that at rural water heating rates a 750-watt installation will return $60 to $75 annually and a 1,000-watt boiler $70 to $100 per year.

Typical installation of electro-steam boiler in an Oregon dairy

The market is confined to small and medium-sized grade A dairies where a convenient supply of clean, odorless hot water and steam under pressure is needed for washing and sterilizing equipment. Outstanding features which aid in the sale of this type of equipment include the following:

1. Steam under pressure and an adequate hot water supply available at all times.
2. Automatic temperature and pressure control.
3. Installation is clean, odorless, attractive and fireproof. This last advantage results frequently in reduced fire insurance rates over fuel-fired boilers.
4. Operating cost compares favorably with fuel costs for other types of installations.

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• RAINFALL FOR THE 1934-35 season will probably be slightly heavier than during the last season, but still below the average for the period of 1916 to 1934, according to a forecast issued by the University of California Scripps Institution of Oceanography at La Jolla, in charge of Dr. George F. McEwen. Professor McEwen anticipates that during the approaching season precipitation in northern California will approximate 85 per cent of the 1916-34 average, while in the southern part of the state 62 per cent of that average. These forecasts, based on air and sea surface temperatures, have proved a reliable guide in the past and will indicate expected rainfall which can be counted upon for hydro-electric power next year.

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• AN ANSWER to the cold feet problem was presented in the Merced district of the San Joaquin Light & Power Corp. A dairyman troubled during winter while milking his cows with the common affliction of cold feet learned it was feasible to wire a slab of cement and heat it with electricity. Concrete was inlaid with heating wires, before being poured, in the milking barn directly in the rear of the cow stalls. As the milking is done with machines, the dairyman walks up and down the slab, watching the progress of the milking in each stall. By turning on the heat about an hour before milking, the slab is quite warm. Capacity of the installation is 2,400 watts.

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• SPARK ARRESTERS for Motorized Equipment, is a new Bulletin No. 577, issued by the University of California, College of Agriculture, and prepared by J. P. Fairbank and Roy Bainer. This booklet deals entirely with gasoline and combustion engine equipment. It might seem to have no significance to electrical agricultural specialists. However, careful reading of it would give the suggestion to the alert salesman for talking the advantages of electrification of as much farm equipment as possible to prevent fire hazard resulting from combustion type of motorization.

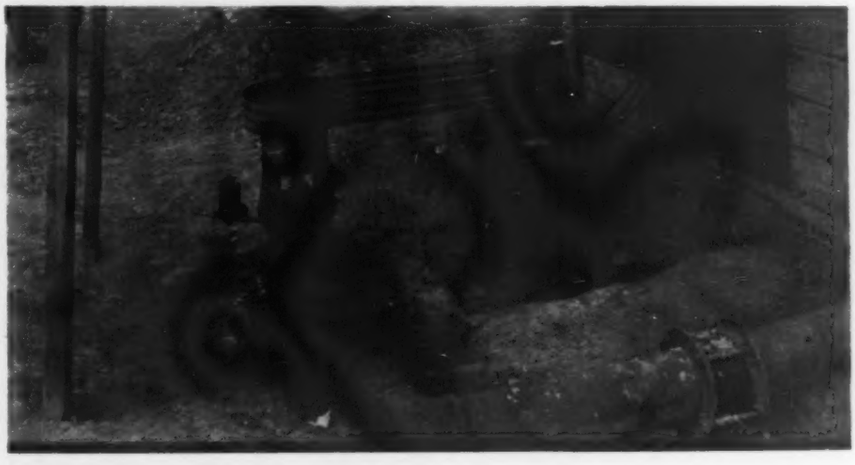
Pump Testing Service Benefits Consumers

TYPICAL of the benefits desired by agricultural power consumers from the pump testing service made available by several of the power companies in California is the experience of the A. L. Shaw ranch in the Santa Clara valley. Irrigation costs on his 31-acre fruit ranch became almost prohibitive when the water table dropped 50 ft. per year over a two-year period. A 40-hp. pumping installation operating 24 hours per day failed to provide adequate water, even with a night crew working in the orchard.

Studies made by a pump testing crew of the Pacific Gas and Electric Co. indicated that the pump was worn and inefficient. Recommendations made included the substitution of a 20-hp. pump designed for maximum efficiency on a 300-ft. lift, together with the construction of a 160,000-gal. reservoir. The reservoir would permit the operation of the pump 24 hours with storage during the night. This would eliminate the labor costs for a night irrigating crew and would also improve the load factor of the plant and reduce power costs.

The reservoir was constructed on a high point on the ranch so that all acreage could be irrigated by gravity flow. It was built with a rented scraper at a total cost of $25. As a result of the changes made, his overall pumping costs have been materially reduced and for the first time in years his orchard has been irrigated adequately.

With irrigation providing the major agricultural load of many of the Western utility systems, pumping plant efficiency is a major factor in satisfactory customer relations.



A pump test resulted in the substitution of this 20-hp. deep well unit for a 40-hp. installation. Note the V-belt drive

Business Building Brainstorms + + +

[*What the Industry needs is a brainstorm to destroy the power surplus pest—Arthur Markwart, president, P.C.E.A.*]

Fans for Winter Heating

USE of the electric fan in connection with house heating has long been overlooked as a load builder. The continued operation of the fan during the winter with a high daily load factor would increase the use of electricity and add to the comfort of the home.

In the steam heating system using cast iron radiators, by directing the air flow from the fan directly on the radiator, the effect is to increase the heating capacity of the radiator, since its capacity to give out heat depends on its area, the more air that is passed over the cast iron coils, the more heat is given off into the room. In regions where extremes of temperature are the exception, the number and size of radiators are seldom sufficient for the coldest days.

Remember the air stream must be *toward* the radiator not away from it. With the air away from the heat source the warm air is spread around the room but the capacity of the radiator remains the same.

For the hot air furnace a fan, even a small one, placed in the cold air in-take is a great fuel economizer and will force air into rooms of the house at a distance from the furnace. With more air through the furnace the temperature of the air is lower and the difference of temperature between this air and the fire box of the furnace is greater so that more of the heat can be transferred and taken up into the house for comfort and not passed out the chimney to heat the great out doors.—H. S. Jones.

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To Sell Church Lighting

CHURCHES are poorly lighted, almost without exception. And yet, because of their nature should be well lighted. Elderly people, with weak eyesight, young people with good enough eyesight but who are just as badly in need of seeing well the hymnals or prayer books during the services, both need better illumination.

The great obstacle which lighting salesmen meet when talking improved lighting to a church is the lack of funds to modernize. This is because the cost of the new installation is always thought of in terms of its lump sum, a sum which few church treasuries either have on hand or are willing to part with easily.

When this cost is broken down into what it would cost per family of parishoners, over a four or five year period, it amounts to very little. A church of good average membership, for about a dollar per family could finance the installation of much improved lighting. The cost could be made as a special assessment collected from its members by the church over such a period, and would hardly be noticed. On the other hand, the benefits from good illumination could be enjoyed almost immediately and throughout the period.

—R. F.

$50 Reward for Brainstorms

Fifty dollars in awards to those Davids who have the best brainstorm for destroying the Goliath, surplus power, that is pestering the electrical industry!

This offer has been made by the Pacific Coast Electrical Assn. for the three best real business building ideas published in ELECTRICAL WEST during the six months October 1, 1934 to April 1, 1935. Ideas will be judged by a committee composed of the president of the association, the chairman of the Business Development and Operating Economics Sections and the Editor of ELECTRICAL WEST. The opinion of the committee will be final in awarding $25 for the best idea submitted, $15 for the next best and $10 for the third best. In addition ELECTRICAL WEST will pay $2.50 for each idea considered worthy of publication by the editors.

Suggestions preferably should be under 400 words, may be published under *nom de plume*, and should be sent to the Editor, ELECTRICAL WEST, 883 Mission St., San Francisco, Calif.

Free Lamp Service Has Many Advantages

COST of empty sockets is a serious loss to the electrical industry. Despite intensive sales efforts, there are many homes where sockets are empty or lamps of lower intensity than is desirable are in use.

To solve this problem, would it not be desirable to adopt the system used in some Eastern communities and practiced at one time here on the Pacific Coast of giving free lamp service? Certainly there would be no empty sockets in such a case and consumption would be built up by seeing that the customer used the proper sized lamp. It would give the power company closer contact with its consumers.

The telephone company owns and maintains the telephone instrument in the home. It provides *telephone service.* Then why not let the power companies provide lighting service? If it worked out advantageously with lamps, it might be extended at a later date to other appliances.—Burt T. Fanning.

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Sales Possibilities For Short Wave Radios

DEVELOPMENT of short-wave radio has done for the radio business what the new science of seeing promises for lighting. As a recent authority says, "short wave has given radio a new five-year lease on life."

As a method of developing sales of these new sets among a class of customer frequently hard to reach, why would not the following technique work advantageously for the dealer? Let the salesman get a schedule of the times when foreign station reception is best in his particular town. Then prepare a list of foreign born residents or at least residents of foreign extraction. He can then get these people into the store, or get a set into their homes at the time when one of the stations from their country is broadcasting. Tune the dial to the proper station, turn the switch and sit back while the prospect hears the music of his fatherland and sells himself on the radio.

Certainly if the idea works on movie stars, who seem to commute between their birthplaces and the U.S.A., it ought to work on the less prosperous class who cannot afford a trip to their homeland.—R. F.

Cooperation on Parade + + +

[*Forecast of forthcoming cooperative merchandising activities, and review of activities in progress or completed, a summary of cooperation at work throughout the West*]

A Thousand Lamps

Outdoor Christmas lighting has a way of growing from year to year. One neighbor starts it, another follows, soon the entire neighborhood has the spirit. Another way in which it grows is that every year a few more lamps are added, sometimes several new strings. Used on living trees, which themselves grow, this is automatic. However, even on shrubs, a thousand lamps can be used effectively, as on the residence of J. P. Murphy, in Forrest Hills, San Francisco, last year. All of which spells business to live dealers and contractors who develop such trade

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Salt Lake Switches on Santa Claus Lane

SALT LAKE City ushered in the downtown Christmas season on the evening of Nov. 16, when Henry H. Blood, governor of Utah, pushed a giant switch to turn on thousands of gayly colored lights in the business district.

The Christmas-decorated sections of the downtown area are known as "Santa Claus" lanes, and include large cut-outs of Christmas trees and candles placed on light poles lining the sidewalks, dotted by myriads of red, green and yellow lights. From these are strung cross-wise of the streets additional streamers of gay lights, interspersed with cut-outs of Christmas toys. The entire effect is one of brilliance and beauty, presenting a novel Christmas setting.

The event attracted a near-record throng. Governor Blood complimented the Junior Chamber of Commerce of Salt Lake City for their civic enterprise in sponsoring this Christmas display. "Let us hope," he said, "that the lighting of the streets will be followed by the beautiful lighting and decorating of the homes and trees of the city. More important, however, is the turning of darkness into light by improving the spirits of all, by making brighter the hearts and homes of those in need and by improving the relationships among men.

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Lighted Hydrangeas

So unusual and beautiful was this bank of electrically lighted hydrangea flowers on the lawn of a San Francisco residence last year at the holiday season that traffic policemen had to be stationed at the corner to prevent motorists driving by and colliding with each other because they were looking at the display rather than at fellow motorists. Each one of the huge blossoms of this large bush was used to conceal within it a colored Christmas tree light. The blossom itself diffused and reflected the light in a lovely pattern of color

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Prior to the downtown celebration an airplane circled the city, broadcasting an invitation, through a loud speaker, to attend the Christmas opening.

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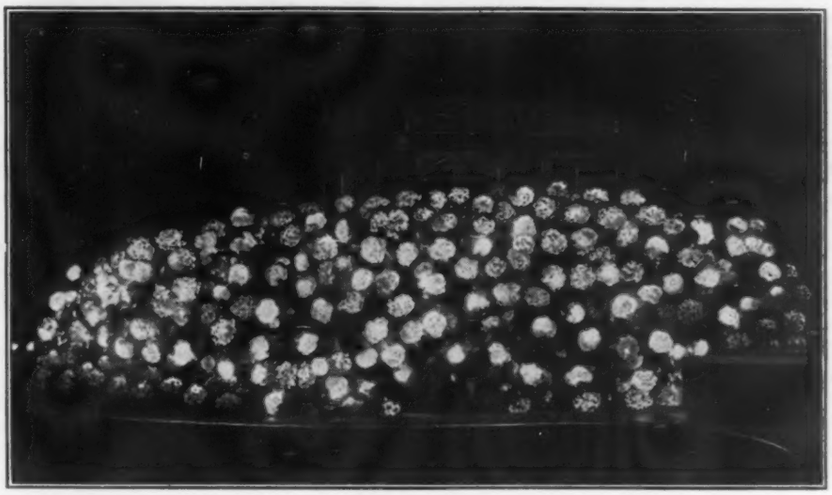
San Diego Show Paved Way for Christmas

CHRISTMAS merchandising of electrical appliances in the San Diego County area will be much brighter as the result of the recent electrical exposition held in that city, preliminary check-up on the results of the business done shows. J. Clark Chamberlain, secretary-manager of the Bureau of Radio and Electrical Appliances, reported Nov. 1 that approximately $15,000 worth of business had been sold as a direct result of the exposition, with some $30,000 as the estimated amount which listed prospects obtained there should purchase. More than 800 prospects were listed in spite of the tremen-



dous crowds which made listing of prospects and direct selling most difficult.

The tremendous amount of educational work done will reflect itself in Christmas sales throughout the entire season, it was predicted. So large were the crowds, in fact, that some suggestions as to charging of small admission fee or moving to much larger quarters next year for the exposition have been made.

Meanwhile, other Christmas merchandising plans worked out by the Bureau of Radio and Electrical Appliances of San Diego County are going strong. "Gridiron guesses" contest has been active as a promotional feature for the sales of radio sets during the football season. A dealer's lighting campaign, with door-to-door sales of lamp bulbs, and a campaign by the power company, San Diego Consolidated Gas & Electric Co., on the reflector type of floor lamps, is reported to be stimulating business in these fixtures and lamps among the local trade.

Dr. G. W. Allison, of Edison Electric Institute, made a spectacular talk which launched the better housing movement in the city, now in active operation. With the Pacific fleet back on the Pacific Coast, the forthcoming World's Fair in San Diego, a spirit of optimism and business stimulation again pervades San Diego which should make for an extraordinary Christmas season.

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• Radio Manufacturers' Assn., representing all the important manufacturers of receiving sets, has announced that a nationwide campaign in the interests of the radio industry as a whole will be inaugurated soon. J. Walter Thompson Co. has been appointed as the advertising agency handling this account and although the details of the plan were not announced it is understood that the theme will be worked along the lines of the improvements in radio reception available with current "allwave" receivers. Dealers will be looking forward to this national promotion as a means of stimulating the radio sales market.

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• To Answer the flood of inquiries coming from various parts of the nation regarding the operations of the Electric Appliance Society of Northern California, that organization is now issuing a new booklet describing in detail its organization, purpose, method of operation, financing, and how the campaigns are carried out. Copies of this booklet, which should serve as a guide to other appliance cooperative groups, are available upon request to the Society, 180 New Montgomery St., San Francisco.

Society Christmas Campaign Uses "Its in the Bag" Rate Offer

LAUNCHED on Nov. 26 and running to Dec. 24 the Electric Appliance Society of Northern California started its second Christmas gift campaign with the experience of more than a year of successful Appliance Society operation behind it. The campaign will be conducted throughout the northern California area served by Pacific Gas and Electric Co. Its theme will be "Give Electrical Christmas Gifts," with the added impetus of the "electricity one-half off on all additional usage," offer of that utility.

The publicity centers around a 52-in. (four-column by 13-in.) ad in 73 newspapers throughout the territory. Newspapers, acquainted with this campaign, were sent special publicity clip sheets, and stereotype mats of a large number of photographs and drawings of appliances were made available to them with which to promote in each locality electrical pages built up around each Society ad.

In addition to this publicity a campaign poster in five colors was furnished directly by dealer representatives of P. G. and E. to every dealer in the territory.

To stimulate window trims and special displays, a window-trimming contest, with prizes aggregating $75, is being offered. The award will be made in three divisions, one prize to each division. San Francisco and Oakland will have a $35 prize, San Jose, Stockton and Sacramento a $20 prize and all other towns will compete for a $20 prize. To compete, photographs must be sent to the Electric Appliance Society's headquarters, 180 New Montgomery St., San Francisco, not later than Dec. 31.

Five-color poster which is used in window and store displays

Salesmen's Manual

A special feature which should prove of unusual benefit, has been the preparation of a small pocket sales manual which will be distributed to every dealer and every salesman of the dealer by the P. G. and E. dealer sales promotion men. Sufficient number of these have been obtained so that if a customer sees and desires it, they can be given freely. The sales manual will contain in terse form the selling benefits of each of the different types of electrical appliances available.

The Society's two educational directors will also visit as many retail stores as possible prior to the opening of the Christmas campaign, with the idea of assisting these stores to plan their own store promotion. Special attention will be devoted to educational work with the store sales people on the particular appliances which the store handles.

Additional publicity efforts will include cooperative floor and window display in all Pacific Gas and Electric Co. offices. Bill stickers will be sent out on all bills. These will be larger than the ordinary bill sticker and cover the amount of the bill so that the first impression will be that gained from the half-off rate offer and not the bill itself.

P. G. and E. Progress, a consumer pamphlet will publish prize winning essays on a contest entitled "I Am Giving Electric Appliances This Christmas." Cards will be displayed on all trucks and service wagons. Additional advertising by P. G. and E. will be along the same lines, featuring the one-half off electricity offer and will be designed for dealer tie-ins to stimulate appliance business. Beside this a special circular has been sent to all P. G. and E. employees requesting that they suggest, encourage and talk electrical gifts for Christmas.

Million Dollar Market

It has been estimated that more than $1,000,000 will be spent in northern California for electrical appliances this year. Dealers have been urged by the

The theme symbol being employed by utility and dealers in displays to stimulate Christmas buying

Society, in order to capitalize on the campaign, to consult with its newspaper, P. G. and E., and its other local dealers; arrange meetings and complete local campaigns to produce maximum results in each city. Suppliers had declared themselves willing and anxious to assist.

Late models of all appliances are available for display and sales. With the National Housing Act opportunity for financing, plus the stimulation which the one-half off offer of the utility makes for the use of appliances once purchased, the opportunities for dealers to cash in on electrical appliances this year seem better than they have ever been at any time.

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Pasadena Dealer Offers Free Wiring

The L. C. Taylor Co. of Pasadena, Calif., has announced free installation up to thirty-five dollars for Standard electric ranges sold its customers in Pasadena, marking the first free wiring offer to consumers on the lines of the Pasadena Municipal Light and Power system. The company's newspaper advertising announcing the wiring offer likewise suggests range purchasing financing through the National Housing Act loans, and offers the company's service to complete all necessary loan arrangements without additional cost.

Free wiring never before has been available to customers using the Pasadena Municipal service and the Taylor Company's announcement, made by Harold Taylor, follows a statement made by C. W. Koiner, city manager, that the city definitely would not go into the electrical range merchandising business. At the same time Mr. Koiner said that the city would consider plans for a continuing campaign to aid Pasadena electrical dealers in their own range merchandising.

Portland Schools Agree To Make Lighting and Sight Test

PORTLAND retail dealers as well as businesses interested locally in the movement for eye conservation have joined with the two power companies in Portland, namely Northwestern Electric Co. and Portland General Electric Co. in the fall and winter Better Light-Better Sight program which is now in full swing. The most significant event so far in the campaign has been the agreement of the county school board to make a grade school lighting test similar to that conducted in Pittsburgh recently and which has resulted in a better appreciation of the part which light must play in the school equipment on the part of the educational authorities.

This test will run over one or two semesters and will require the cooperation of the entire trade in the region. The school board is said to be very much interested in lighting improvements and is looking forward with enthusiasm to making the study with the industry.

To review briefly, the Better Light-Better Sight Bureau of Portland has worked out a program for light certification for the home which means business to all dealers in lighting equipment in the region. Based on figures of 96,500 residential customers, the market survey indicates a 5 per cent market or 4,825 potential in study table lamps at $6.50 average price, a total of $31,362. Floor lamps, it is estimated, should sell to 3 per cent of the residences or 2,795 at an average price of $12 or a total of $33,540. "Pin-It-Ups" or similar lamps should sell to 7 per cent of the residences or a total of 6,755 at an average price of $1.75 or a total of $11,821, making a total market of 14,375 lamps for a total average price of $76,723.75.

Backing up this promotional campaign is an extensive newspaper advertising program by both of the utilities. Northwestern Electric Co. has a series of four-column by 14-in. ads using a novel theme based on the idea that the danger zone of seeing is in between poor light and fairly good light, which zone is termed "fog light." Dramatic copy builds the dangers of trying to do close eye work in this "fog light" zone.

Dealers to cash in on the activity are advised to advertise, purchase and use sight meters in their own demonstrations of lighting equipment, give a prominent place in their stores to such demonstrations, train the sales staffs in such work, if possible put a sales crew in the field, make window displays and display complete living rooms showing the proper lighting and placement of lamps.

Three months of the campaign have already been carried on with great success with programs to parent-teachers associations, civic clubs, newspaper promotion and light sight demonstrations. In December indoor and outdoor Christmas lighting will be added to the promotion; in January a home redecorating campaign by wallpaper and paint interests cooperating with lighting interests will be sponsored; in February talks before community clubs and surveys will be made; in March the Better Light-Better Sight Bureau will tie in with the spring clean-up drive.

Both power companies have eighteen trained home lighting girls in the field making house-to-house calls on all residential customers giving a lighting demonstration and teaching the value of better light to eye conservation and health. Customers are directed to dealer establishments for the purchase of the approved I.E.S. standard lamps.

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• *Northwestern News*—A new newspaper-type publication is being published by Northwestern Electric Co., Portland, for distribution to all salesmen and dealers and their salesmen in the territory served by this company. The sheet is a promotional one, telling the news of the commercial programs and stimulating salesmen in every way possible. The first issue was brought out in October.

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• ELECTRIC TABLE cookery will again be featured nationally under the direction of the Edison Electric Institute, according to announcement just made by C. E. Greenwood, commercial director. The objectives will be to create wider interest in the promotion and sale of electrical housewares among all retail outlets and encourage sustained effort in order to establish the small appliance market on a higher plane. It is contemplated that a monthly news medium entitled "Electrical Housewares" will succeed "Table Cookery Topics" and be circulated to all classes of the trade through help of manufacturers, wholesalers and utilities. A national better merchandising contest will be announced at a later date. The slogan "Electric Table Service Saves" will continue in use throughout the program.

Crowd which crammed the evening entertainments of San Jose's exposition

San Jose Exposition Breaks Its Own Previous Records

NOT even a heavy rainstorm on its opening night could dampen the extraordinary success of the San Jose Electrical Exposition sponsored by the Santa Clara County Electrical Development League and the Electrical Appliance Society. Staged at the auditorium rink Nov. 14 to 17, attendance reached well over 18,000, topping the 13,000 attendance of the previous exposition a year and a half ago despite inclement weather during the entire show period. All 20 booths in the show were taken early in the arrangements by electrical and department store merchants of the Santa Clara County region and a late demand for extra booths from dealers who had not taken quick enough action indicated the widespread interest created by the exposition and the advertising carried along with it.

Promotion for the show took the form of spreads in each of the two local newspapers, with tie-in advertising from most all exhibitors. Three hundred inches was run by the show committee itself in each of the two papers. Streetcar banners and radio announcements over station KQW were also used effectively. The entertainment program each evening of the show was broadcast over the same radio station.

Another feature which attracted widespread attention was a short-wave radio contest in which the best letter on short-wave programs heard was used as the basis for award of a short-wave radio set. Fred Doerr, president of the City Council of San Jose, himself an electrical dealer, opened the show.

Cakes for Charity

Daily cooking schools were conducted in the afternoon by Mrs. A. V. Farnsworth, home economist, as hostess, and Mrs. M. M. Ritter, assistant hostess. A feature of the contest publicity was a cake-baking contest, in which the first prize given was any $50 piece of merchandise on display in the show. Nine other merchandise prizes were also awarded in this contest. The contest brought entries from several hundred women. All of the cakes were then turned over to the Home of Benevolence and sold by that organization, the proceeds going to it as a benefit for its relief and charitable work.

Attractive booth of President Bill Harvey employed cut-out decorations with colored lighting between the layers

Decorations were simple and yet very effective. No attempt was made to decorate the maze of rafters with crepe paper or bunting. Instead, large disks of wallboard were placed at the lower rafter level toward which the directed light from concealed reflectors built into decorative and modernistic "urns." These in turn were decorated with a lightning effect, on a flasher, at the base. This had the effect of keeping the ceiling level low and concentrating the eye attention on the merchandise.

The total budget for the show was only $1,500, which kept the cost to each exhibitor very low and yet produced a remarkable publicity result. The main door prize was a $100 piece of merchandise selected by the winner from anything on exhibit. Other prizes included merchandise items of electrical appliances, six or eight of which were given away at each session. Entertainment, through the courtesy of the Stewart-Warner Co., was provided at very little expense. It consisted of Captain Dobbsie, and the Stewart-Warner String Ensemble. A local entertainment group, Carney Saville and Co., also entertained with specialty numbers.

Committeemen whose efforts were responsible for the success of the show included Bill Bowler, P. G. and E., chairman of the general committee; Orville Johnson, Graybar Electric Co., who had charge of the public address system installed by Roy Butcher and supplied by Graybar; Dave Tuttle, General Electric Supply Corp.; Roy Butcher, electrical contractor; Bruce Brownlea, Westinghouse Electric Supply Co.; Lee P. Van Atta, The Electric Corp.; Larry Greer and Al Purdue, P. G. and E.; Al Smith, of the radio department, Hart's Department Store; Merlin Jackson, washing machine department, Hart's; Art Hamilton, the Farmer's Union; and Jack Ross, of P. G. and E. George Thompson, of Koerber-Thompson, was in charge of the finance committee. The entertainment committee included Allan Young, Sherman-Clay Co., chairman; Carlos Williams, of Hale's, and Al Smith. William Harvey, Mission Electric Co. president of the league, was chairman of the cake baking committee and active throughout all arrangements. Charles Moore, of Moore Electric Supply Co., contributed materially in supplying of entertainment, as well as did C. L. McCarthy, manager of station KQW. George Tribble, of Apex-Rotarex Manufacturing Co., was also active.

Breaking at just the right time to give it an added punch was the one-half off on extra electricity bargain rate announced by Pacific Gas and Electric Co., which was featured in the show.

A year and a half ago at the previous show San Jose dealers demonstrated that the best way to handle an electrical exposition is through their own committees, working cooperatively together. This was given another test and proved even more effective on the second venture.

The Rocky Mountain Electrical Assn. not only uses billboards to give its merchandising messages to the public; it also utilizes them in its meetings to help the membership envision its ambitious promotional and sales program. Here is one, with the new Study lamp a built-in feature, that was used during a recent meeting of the organization.

Women Lead Tri-state Christmas Program

With 25,000 women already mobilized in one unit of the activity alone, what is claimed to be the greatest business-capturing movement ever attempted by the electrical interests of Colorado, New Mexico and Wyoming is moving forward under the leadership of the Rocky Mountain Electrical Assn., the Electric League of Colorado, and other industry groups serving that region. The industry's next big objective is the Christmas-buying sector.

"Give something Electrical for Christmas", a time-tested slogan, this year will reach the eyes or ears of every person in the three states—via radio, billboards, newspaper advertising, direct-mail, window-displays, posters, banners, stickers, electrical exposition, contests and other media.

Through the combined efforts of the distributors, utilities and associations hundreds of department stores, specialty shops and other appliance outlets will join in the drive. Thousands of stickers, streamers and cards will greet the eyes of those who pass store windows. "Give Something Electrical" will flash by on hundreds of delivery and service trucks.

Merged with the Christmas merchandising activity is the Better Light-Better Sight movement, in which the new study and reading lamp is being promoted. It is in the study lamp activity that 25,000 women, mostly club members, have been interested, by means of a contest sponsored by the Colorado Women's Service Club, Inc., which is operating through approximately 100 associated clubs.

More than 200 home meetings, at which there will always be between 20 and 50 women present, are now under way. The study lamp is being demonstrated in each and the message of Better Light-Better Sight being delivered by representatives of the electrical association. Tips and actual business growing out of this campaign are distributed among all dealers handling the study lamp carrying the I. E. S. tag of approval.

To maintain interest and to properly administer the big program, twice-a-month meetings are held in Denver. The results of these deliberations are immediately passed on to all members of the association, with the result that concurrent programs are in effect throughout the three states.

Linked with the tri-state merchandising program is the government's home modernization plan. Through the Electrical League of Colorado, Denver, and other electrical organizations which are cooperating with the association, practically every branch of the industry is profiting through the modernization campaign.

One of the most potent mediums for keeping things electrical before the public is *Electri-News*, a monthly publication, financially supported by every branch of the industry. The whole territory will be blanketed with this eight-page, gayly-colored, and highly-illustrated little publication, for the most part through the utilities.

To keep merchants always informed of the activity, the electrical association issues a bi-weekly publication, *Electri-Gram*, containing suggestions for merchandising electrical goods and participating in the campaign.

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Bureau's Specification Range Featured

WITH a special campaign model range priced at $117.50, built by several manufacturers to the specifications developed by the Bureau of Power and Light, Los Angeles, a feature campaign on these ranges began Nov. 15 and is to run to Dec. 31. The campaign model has four surface units, temperature control and a 16-in. insulated oven.

Since the Bureau of Power and Light itself does not merchandise and all such ranges must be sold through dealers, the Bureau, however, carries several promotional costs. Notably it provides free wiring on approved ranges and water heaters installed in single and duplex family dwellings. The Bureau also pays the cost of "pigtails" on the campaign model for connection to the wiring of the house.

Manufacturers, jobbers and distributors are assisting dealers in obtaining salesmen and handling the details of selling in order to put the campaign over successfully. The Bureau, in addition, conducts a school of instruction better to qualify dealer salesmen to present the major features of electrical appliances.

In addition, a trained staff has been organized to handle complete arrangements for property owners who wish to take advantage of the financing plan made possible through the Federal Housing Act. Large newspaper advertisements with dealer tie-in ads will also feature the campaign.

A piece of promotion material which is attracting considerable attention is a pamphlet recently put out by the Bureau entitled "Modern—Electrically Too." It describes the complete electrical installation in the Palmer steel house on display on Wilshire Blvd. near Windsor. Each of its electrical features are detailed. The text leads from kitchen to bathrooms and living rooms, and into a summary of the savings in building costs which the electrical equipment will make over what would be necessary for other means of heating and cooking.

A further promotion being made by means of newspaper advertisements and contact with the public and dealers is a "Light up for Christmas" campaign for spreading Christmas cheer with light. Downtown and business district special decorations will feature part of this program and dealers have been asked to tie in and make the most of the publicity.

Codes in Operation + + +

[*Practical and significant suggestions from the code authority chairmen of this territory telling how to make code operation effective*]

Northern California Convention Reveals Code Progress

CLIMAXED by a meeting which would set aside all doubt as to whether the electrical contractors' code is working or can be made to work or not, the one-day convention of the Electrical Contractors Assn. of Northern California, Nov. 9, 1934, in San Francisco, inaugurated the first of what is intended will be regular quarterly meetings of this group in the future. Representatives from the regions centering about Sacramento, Stockon, Fresno, Bakersfield, Monterey, Salinas, Watsonville and Santa Cruz, San Mateo Co., San Jose, San Rafael and Santa Rosa were present, besides the large attendance from San Francisco and Alameda County.

President Lloyd Flatland in opening the meeting called attention to the present organization strength of the northern chapter with its 400 members, the southern California chapter with 250 to 300 more, out of a total in the state of 2,000 contractors. He pointed out that it was to the interest of members to increase the membership at least 200 more in northern California, and described the work of the code coordinating committees of the Construction Industry Conference as a future development along association lines.

Protest Motor Policy

The Motor Section, chairmaned by Frank Boyd of Oakland, presented a strong protest against the newly announced policy from the motor manufacturers regarding discounts to motor dealers, industrials and machinery dealers. Not only a strong resolution protesting these new policies was voted, but committees were formed to take more concrete action in protest of the inequitable discounts set forth in the new policy.

Ed Brumfield, representing the Sign Section, presented A. F. Whitmore, secretary of the newly formed Association of Neon and Electric Sign Manufacturers of northern California, in which 80 per cent of the sign manufacturers in the northern California region have been enrolled as members. Full cooperation between the two associations was pledged by Mr. Whitmore.

Secretary-Treasurer Ed Martin, reporting for the finance committee of the association, precipitated considerable discussion as to the methods of financing the northern chapter in relation to local association financing. After considerable discussion the executive committee was empowered to set up satisfactory methods, if possible without raising the annual dues.

Clyde Chamblin, speaking for the educational committee, cautioned the members that in devising organization procedure it be kept in mind that procedure be as simple as possible.

Quantity Survey Advice

As to quantity survey operations he set forth three principles which must guide such activiy: (1), that it must be conducted completely "on the square" with no thought or attempt to collude or to fix prices; (2), that too many rules are to be avoided and that rules set up for regulation of procedure will only live so long as practical experience proves that they are sound; (3), that the relationship to the public must always be borne in mind even though the code under which contractors now operate is merely set up to regulate conduct between contractors and their competitors as well as general contractors. He advocated that good sportsmanship be developed and that as far as possible the Golden Rule be the one rule to which all others should be subservient.

Bob Griffith, reporting for the data book committee, pointed out that the question raised by Mr. Chamblin as to what contractors will do when they become busy can be answered by complete reliance in the "data book," a suggested resale price list published by an independent agency, in the estimating and bidding of work. He presented an interesting chart which showed that the discounts and margins set up for the individual items in the resale price list were barely enough to cover actual cost of the job and did not guarantee any actual profit. A. E. Rowe, the publisher of the book, explained how the Pacific Coast Electrical Price Book is derived from manufacturers' and wholesalers' prices on the minimum quantity purchasable. He offered to include in the book any items that contractors had a demand for with the one reservation that the manufacturer of the material must be established and must be relied upon to keep the publisher acquainted with all price changes as they are made.

Charles Shipman, reporting for the labor committee, told of the negotiations for the consummation of an area agreement with labor for this region. President Flatland asked that each local association keep posted and that steps would be taken shortly for an area agreement with labor. Portland, Ore., was announced to have reached such an agreement in that region.

Wholesaler Policy

Victor Lemoge, reporting for the wholesaler's relations committee, reiterated the association's policy as that of recognizing distribution as proceeding from manufacturer to wholesaler to contractor. He complimented the wholesalers for the fine cooperation they have given and stressed strongly the need for cooperation with the wholesalers on the part of the contractors.

Fred Todt, General Electric Supply Corp. and chairman of the newly formed Industry Board of Review, told of the self-interest of contractors and wholesalers working together in closer cooperation. He asked the contractors to compare in their own minds competitive conditions today on the basis of the business available, with those previous to the operation of the code. He spoke of the wholesalers' classification of buyers and urged that contractors cultivate the industrials who are not wholesale buyers and get more business from them.

Likening competitive conditions before the code to a football game where 22 men were placed on a field with a football and told to go to it, with nothing barred except machine guns, he made a strong case for the enactment of rules of fair competition in business. He then cited a portion of the decision of Federal Judge St. Sure in a case supporting the NRA code. "Under all of the circumstances these code regulations are reasonable and so far as

perverse human nature will permit they are accomplishing their purpose."

Night Meeting

After a dinner at the Whitcomb Hotel that same evening the night session of the convention opened. To this members of the industry at large were invited. President Lloyd Flatland presided and introduced first Vice-President Charles Langlais, who described briefly the Construction Divisions Conference set up in San Francisco for correlating the various divisions of the construction industry code and setting up of the first central bid depositary in the United States for the construction industry. He introduced Mano Zan, of the state contractors license department who acted as chairman of this Construction Divisions Conference. He told of the interrelation of the construction industry divisions and of the work of the state license bureau in correlating their activities. Before the advent of this code, he stated in a strong comment, "business had descended to standards that were little better than thievery."

R. A. Daddisman, custodian of this bid depository, was the next speaker describing its functions and purposes. Albert E. Kohn, representing the Building Trades Council, also pledged the support of organized labor to the functioning of the NRA codes in the construction industry.

C. B. Kenney, chairman of the legislative committee, had as speakers for him Ralph Wiley, chief of the Department of Electricity, San Francisco, who described the department's cooperation with the electrical contractors and with retail sales organizations. He pointed out that legislation of any type in order to work, must be worked from the basis of cooperation, to produce advantage to every one concerned. Frank Kiefer, Pacific Coast Electrical Bureau, described the standard electrical ordinance and substandard ordinance which are offered to smaller communities for the regulation of wiring installations and control of sales of hazardous appliances, ordinances which have been prepared by the cooperative effort of the entire electrical industry.

NRA Enforcement

J. E. Prisin-Zano, legal counsel for the NRA in the San Francisco region, told of the new and third phase of NRA development. The first phase was that of education and codification, the second of cooperation and organization of industry, and the third will be that of enforcement. He interpreted the national election results as a mandate from the people to support the NRA and the New Deal.

Then he made a strong point that the fair trade practice provisions of the code were inserted into such codes because the industry members themselves had demanded them. He then pointed out how it was to the interest of each industry to support its own trade practice rules, or if they were found inequitable, to have them revised. He described the procedure which will be followed to procure enforcement and pointed out the advantage of a state like California which has a recovery act in support of the NRA. He pointed out, also, that the codes are flexible and are subject to revision by the industry under proper procedure and that the courts so far have almost in all cases ruled in NRA's favor. California decisions had also upheld CRA, he assured his listeners.

Edward Martin, heading the public relations committee, pointed out that under fair competitive rules there has been eliminated from the contractors' operations the need or urge to cut down the size of any electrical job.

R. E. Fisher, vice-president in charge of Public Relations and Sales for the Pacific Coast Gas and Electric Co., told how his company had given instructions to cooperate with the Contractors' Code to each of its divisions. He complimented the association on its constructive effort in putting its own house in order and pointed to the great opportunity for better business in the Housing Act Modernization Program, plus the additional incentive provided by his own company at present in the offer to its consumers of a 50 per cent discount on all extra electrical energy used above the previous year's meter readings.

Mr. Martin concluded his part of the program with a plea to all those in the electrical industry who have any problems or complaints that they take them up directly within the industry instead of shouting them from the housetops. He assured anyone with a legitimate complaint that the industry would see that he received fair play.

New Blue Eagle

Wesley Ashe was introduced by Mr. Flatland to speak on the New Blue Eagle distribution of the NRA. Mr. Ashe is in charge of this activity for the NRA in the northern California region. He named three objectives: (1) The setting up of an NRA committee to build up the prestige of the Code Eagle, and develop consumer acceptance, so that the value of the Code Eagle will become in itself something to be desired and respected. (2) The San Francisco County Consumers' Council, headed by Dr. Lee, superintendent of schools, is being set up as the first one of its kind in the West. Its function will be to bring a closer realization to consumers of the value to them of compliance on the part of the trade with the Code. (3) Finally he urged that Western administration of NRA activities be maintained here in the West. This, he felt, was very necessary and a policy felt to be imperative by George Creel from the very beginning. This would provide a regional decentralization and provide quicker answers to all of the questions which the industry might want to know as to rulings and interpretations in the administration of the Code.

In ending his talk, he said, "You have been tough—but you have an industry that requires toughness."

Describes Wholesale Code

Al Nicoll, manager of Graybar Electric Company, San Francisco, and a member of the wholesalers code commission for the Region, who had just returned from a Code Conference in New York spoke on the electrical wholesalers code and its relation to the electrical contractors' code. Among its features, he said, it provides local autonomy with its local commissions in each trading area. He announced that Arthur Halloran, former editor of the Journal of Electricity and later of "*Radio*," has been engaged as secretary of the local commission.

Among the rules which are considered unfair trade practice by the wholesalers he quoted those regulating lump sum bidding, free delivery, consignments, returned goods. He held out hope that Section 7, "Promotion of fair competitive methods" would be beneficial in the setting up of such a thing as credit control, which contractors have long asked from the wholesalers Among other provisions of the wholesaling code, also of the general wholesaling code, he pointed out the limitation on cash discount period, false billing, secret rebates and discriminatory practices. One of its finest features he felt, was that it permitted the wholesalers to sit down with the manufacturers to determine the proper differentials and adjustment of margins in the distribution of supplies. He also stated that the approach of the electrical wholesalers on the Pacific Coast would be that of "What we can do—not what we *cannot* do," which he declared to be an outmoded attitude.

Munson Duprey, compliance division for the construction industry, NRA, was the last speaker. At the time of the Sacramento convention of the contractors, he said, compliance complaints were being received by his department at the rate of about forty a week. He pointed out that it is significant of a new attitude in compliance that complaints have reached only five a week.

P. E. C. A. Renaissance

AS DAWN follows darkness, a dark age or period is followed by a renaissance, a new day, a rebirth. Certainly the dark days of association effort in all branches of the industry seem to be giving way to the first streaks of a new dawn. And most significant of these is that the one group which can bring an inter-relation between these various branches, the Pacific Coast Electrical Association, has come back into being with such a fundamentally new and realistic viewpoint of its job.

Anyone who sat through and listened to the presentations of the problem papers at the two conclaves, one in Los Angeles, the other in San Francisco, cannot have failed to feel that something fundamentally different was taking place. Here was the former group whose major interest and thought had been devoted to the utility branch of the industry, frankly asking itself searching questions which reached deeply into the basic problems of related groups in the industry too—manufacturers, wholesalers, contractors, dealers, inspectors,—yes, even the public. Here was an evident sincerity to know and to appreciate, even to help solve, some of the problems which have long eaten at the vitals of many whom perhaps poet Kipling might term "brothers under the skin."

This utility group for years has been in a sheltered position. From its high place it was easy to look no deeper than the surface either of its own or of the problems of related groups in the industry. From this position, in the past, it was not uncommon to put forth advice and make suggestions, which to say the least, though sincere, had a patronizing air and a shallowness of understanding about them that often made more enemies than it did friends.

It was refreshing, therefore, to find the utility group *asking*, rather than *telling* what to do. In revealing to the other branches of the industry the profundity and the intricacy of its own problems in the face of present day conditions it opened up its own methods and traditions to critical inquiry. It was heartening to see it ask as to the soundness of its own standards, so long considered sacrosanct, and to ask the industry at large to bring to the answering of these questions as fine a frankness and as constructive an attitude as it brought to them itself.

As President Markwart said, "If introspection, if self-analysis is good for the individual every once in awhile, it will be good for us as an industry."

Engineers Look at Costs and Sales

LOGICALLY enough, the problems laid open before the industry began with an analysis of the type of load conditions now existing, asking what types of load and how much can be added to existing facilities. For the first time to many in the industry was there brought an acute appreciation of the peaks and valleys in the daily load upon generating and distributing facilities. Next came a searching inquiry into how costs of distribution might be lowered without unduly lessening safety or endangering the high quality and continuity of service rendered by the private utilities in the past. In these discussions many of the pet ideas, many of the perfectionist standards were opened up for scrutiny. Undoubtedly from this inquiry will come many revaluations of such standards, many revisions and perhaps better balanced practices in the field of installation and maintenance

If it did no more than to show the entire industry the more intricate demands made upon utility service for voltage perfection as a result of radio. which demands this perfection, and refrigerators which make perfection very difficult of achievement, the paper on voltage regulation will have meant much to the industry.

Finally the engineers took stock of free service to ask the industry to help utilities to draw the line somewhere between complete, all-embrasive service and none whatsoever. A reading of the papers in this issue will bring to anyone who was not fortunate enough to hear them presented an opportunity to appreciate the sincerity and thoroughness with which these subjects were treated.

All in One Sales Boat

IN AN off-handed, academic way, those engaged in the selling end of the electrical industry may have been included in a consideration of the sales problems of the utilities of the past, but there could be no doubt on the subject after the Business Development Section part of the two conclaves. For the first time an overall, all-inclusive, interdependent realization of the selling job was brought home.

Beginning with home electrification, and sweeping on to consider what can be done to increase consumption of commercial, agricultural, and industrial power, the questions did not stop at the superficial,

surface aspects of advertising and selling, which would have sufficed in any day but this, but plunged boldly into the forbidden fields of manufacturing policy, discounts, salesmen and sales methods, profits, losses, competitive situations, in fact the entire range of intimate difficulties in this field.

Cooperation, too, was taken all to pieces, to see what made it work or fail to work. In this analysis, likewise, the field of inquiry penetrated through all of the branches of the business in a most salutary and "clinical" fashion, as one speaker termed it.

Finally, customer relations, which is the sum total of all of the assets and debits of all the previously considered phases of the business,—the rebound from the customer, the public, from all of the sales and engineering efforts of the industry—was given a thorough airing. Does this ultimate happy reaction from the public, which is so desired, result from how a multitude of details are handled, or is it a matter of basic policy—or both? That, like Hamlet's famous "To be, or not to be?", is the all pervading question.

Although there arose to the lips of many the desire to answer the questions propounded, and although to the other questions there may never be an answer, the conclaves just concluded left these questions open. During the next months until March 1, 1935, it will be the privilege, nay, the duty, of those who can contribute answers to these problem questions, to do so. Out of this should come many things:

First, there should break forth a flood of ideas and thoughts from people in the industry who have never before been given to feel that their voice is worth hearing. Second, there should be a purging of long pent-up convictions and burning ideas as to what could be done to make this industry all that it should be. Third, there should come a more widespread appreciation and understanding of the difficulties and problems that beset other branches, other individuals in the industry. Finally, upon these bases, with a reality and genuine sincerity born of better knowledge, wider range of ideas, and a refreshed viewpoint, there should come a program of sound development for the industry as a whole that will lift it back into public goodwill and consequent profit and satisfaction to all engaged in it.

Back to Fundamentals

BECAUSE industry attention is focused on home electrification, we put the question of a successful merchandising formula to the sales manager of one of the Western utilities which has an average annual consumption in excess of 1,000 kw.-hr. per year. "Stick to fundamentals," was his answer.

Taking electric cookery as an example, he amplified his formula. Many commercial departments, in his opinion, have become so involved in dealer cooperation plans and programs, rates, worry over gas competition and study of trial and rental plans that the primary job of selling electric cookery has become lost in a maze of secondary considerations.

Here in the Far West electric range sales reached a peak in excess of 60,000 units annually. During the depression they slumped to less than one-third this figure. The sales curve has turned upward. If the industry is to regain the momentum of 1926, 1927 and 1928 range sales, the admonition regarding fundamentals is worth heeding, for certainly fundamental selling technique made these earlier records possible.

Records for some of big range years have been studied. Here are some of the fundamentals they disclosed: Cooking schools operated on a regular schedule throughout the territory served. Active home service departments to follow up every sale and answer every complaint. Consistent year-round advertising and sales effort backed up by one or two intensive special campaigns. A modernization program to speed up or replace antique slow cooking equipment. Well-directed sales effort to induce every individual in the industry to use electric ranges. In the light of recent experience two additional points are vital: a long-term purchase plan (up to 36 months) available to dealers' customers as well as those sold by the utility and a plan of remunerating salesmen which will give them full credit for sales made by dealers.

This formula has been tested and proved. It should work as well in 1935 as it did in 1927. "Back to fundamentals" may evoke the remark, "that's old stuff," but then so too is almost any common sense proposition.

Industry Objective

OUR industry, in common with others which have made tremendous advances during the life of the present generation, has reached a point where it is necessary to stop and re-orient itself before proceeding. Before logical plans can be made for further advancement, objectives must be assigned. While mottoes and catch phrases are trite and commonplace, they nevertheless can concentrate attention on the main objective and serve as a basis for judging policies to be followed. It is with this in mind that the following phrase is offered as embodying the mission of the electrical industry: "To decrease the drudgery of working hours and to increase the enjoyment of leisure hours."

Significant Trends + + +

[*Signposts which point the road to improved business or method, brief, pertinent, useful hints as to HOW someone has blazed a new trail*]

Radio Service Men Ask for Ordinance

Portland's organization of the Association of Radio Technicians, recently came to L. W. Going, chief electrical inspector, and asked his assistance in drawing up an ordinance for the control of that branch of the industry in Portland. Mr. Going cooperated with them in this matter and by the middle of November had a tentative ordinance drawn up and mimeographed ready for presentation to the city council.

There are 10 sections in this tentative proposal, covering the following: Registration of radio service men. Application for registration, registration fee (suggested fee $5.00), establishment of a radio board, duties of the radio board, suspension or revocation of certificates, identification of person servicing equipment, procedure for filing complaint against registered service men, penalty for violation, and enforcement of ordinance.

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Portland's New Code Held Up 40 Days

A long awaited new electrical code for Portland came before this city council Nov. 12. In spite of the fact that it had been formulated by representatives of the electrical industry, had the approval of the Oregon Building Congress, and the unqualified support of four out of five of the council members, one commissioner objected. This was enough to throw the final reading over to the Nov. 22 meeting.

Chief Electrical Inspector L. W. Going said in relation to the matter, that while there was no doubt of its passage, publication cannot be authorized until 30 days after that date, and figuring the time necessary to print it, the Code could not be in the hands of the users until about the first of the year.

The objecting commissioner bases his objection upon conduit requirements, saying that the code would cause owners to buy a lot of pipe that might never be used. This is one of the points carefully scrutinized by the framers of the Code. There is every indication that with the completion of the Bonneville dam, power rates will be cheaper, to be followed by the more extensive use of current. Buildings built in the interim should provide facilities for adequate wiring in view of the heavier loads that will then be common. Otherwise, present builders would be put to future hardship and cost in extensive remodeling if their built-in conduit is not sufficient for later requirements.

Portland has heretofore had a distinct code of its own. The new code proposed is broken down into two parts; namely, the National Electrical Code coupled with supplementary provisions which add to or subtract from N.E.C. provisions. For instance, there are a number of innovations in relation to service entrance requirements, due to the new sequence metering. Also, much additional matter is included in connection with Article 20, N.E.C. which includes the requirements for the design of wiring lay-outs. These are only two instances of extensive supplementary matter.

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How to Safeguard ELECTRIC SERVICE in the Home

Observe these simple safety rules

To Teach Safety

Clever and correct is a large poster being furnished electrical inspectors, or anyone else in the trade who can use it, by the electrical cord manufacturers group of NEMA. It illustrates by cartoon 10 safety rules with regard to home wiring. It stresses proper use of cords, importance of Underwriters label, repairs or additions to wiring by competent electrical contractors and proper wiring inspection by city inspectors

...in Wiring Rules

• An Excellent Tip in the handling of requests for special rulings by the public was made by President William Mahan of the International Assn. of Electrical Inspectors, in private conversations while out here for the Inspectors' convention. In his own local experience he found that wherever an owner came to him asking for a special ruling he or his men talked with the owner and found out whether or not he understood the full significance of the limitations which the special ruling would make upon his wiring. He found in most cases that the customer did not understand that a chiseling of the wiring and the special rulings to obtain this procedure would materially reduce his convenient use of electricity. When this was made plain the need for special rulings had almost always disappeared. It is a suggestion which other inspection departments can use to good effect.

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Radio Interference From Imported Lamps

Discovered as a result of extensive radio interference inspection in the vicinity of Pomona, Frank McMahon, building and electrical inspector of that city, reports a phenomena caused in inferior imported lamps. Where Japanese lamps are burned at any position aside from the vertical, due either to a leakage in the lamp or to the fact that the lamp in manufacture does not have enough of what the lamp companies here call "getter," a material used to remove deposits of free tungsten, a discharge of tungsten occurs in the neck of the lamp which builds up a condenser effect that by discharge feeds back over the line, causing radio interference.

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• Douglas Robertson, electrical engineer for the Canadian General Electric Co., Vancouver, B.C., has acted as secretary of the committee working for a licensing act for electrical contractors in the province of British Columbia. He was also on the Provincial Committee of the Canadian Electrical Code, which has just been revised and will be issued in its 1934 edition.

...in Construction

Gray's Harbor Contractors Organize

A group of seven representative electrical contractors constitutes the Gray's Harbor Electrical Contractors' Assn., recently organized to include the cities of Aberdeen, Hoquiam, Raymond and Montesano, Wash. One of their first moves was to join the National Electrical Contractors' Assn. Five of the seven members are now in the National Association, and it is understood that arrangements are being made to form a Chapter of the N.E.C.A. there.

The local association has chosen its committee for code administration for the group. This group includes the contractors of Gray's Harbor county and parts of Mason, Pacific and Wahkiakum counties, as far south as the Columbia River. This committee consists of: F. W. McEachron (chairman), Hoquiam Electric Co.; W. W. Campbell, Industrial Electric Service Co., Aberdeen; F. P. Burrows, Aberdeen Electric and Heating Co., Aberdeen, and C. G. Johnson, Johnson Electric Heating Co., Raymond. The fifth and non-contracting member is F. S. Foster, vice-president, F. G. Foster Co., wholesale hardware and industrial distributors of Hoquiam, Wash.

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4,000 Ceiling Light Outlets on One Job

The one big wiring job being done in Vancouver, Wash., is the Columbia Memorial building, for which the electrical contractors are The Classen Electric Co., Vancouver. To be used for burial purposes, it is of concrete and will contain many hundreds of crypts and private rooms. As these will be visited frequently by owners of the crypts, it was desired to have a particularly beautiful illumination, although at the same time subdued.

The scheme adopted was to arrange thousands of incandescent lamps in groups or clusters in the ceiling of the areaways, and below these clusters to suspend a colored glass false ceiling. The effect, then, will be of light coming through a skylight. In alternate sections of the ceiling there will be powerful direct lighting units.

Made to last for centuries and withstand any of the forces of nature, all wiring is run in conduit in the concrete and every one of the ceiling lights is connected through its individual outlet box. In all, there are over 4,000 of these outlet boxes for the indirect lighting clusters alone, and the boxes are laid on 8-in. centers each way.

Working ahead of the actual construction, the contractor was able to cut and thread the thousands of nipples and assemble the boxes in gangs in the shop. From thence they were carried direct to the job and laid on the forms and connected up, ready for the pouring. But this was no end of a tedious job since a hole had to be bored under each box and through the form, in order to drain off water and thin concrete, which would run in under the boxes if not drained off, and thus clog them. Each box also had to be nailed to the form.

After the holes had been bored through the forms, each box in each gang had to be nailed down to the form

Assembling boxes and nipples in gangs in the shop, for the Columbia Memorial job; the two Classen brothers, Elmer and Henry, of the Classen Electric Company

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• "The Electric Eye" official organ of the Vancouver Electrical Association, has discontinued running is current market quotations, its suggested retail prices for electrical goods. Instead such sheets are distributed separately to members of the contractors association. Instead the Electric Eye is devoting itself more and more to matters of policy and of educational interest to the electrical industry in the Vancouver area.

...in the Motor Shop

Motor Discount Policy Criticized by Dealers

NEW discount policies for the sale of motorsand control equipment were announced by a number of electrical manufacturers to be effective Nov. 5, 1934. These new policies aroused a widespread storm of protest among motor specialists throughout the West and were the cause of many pointed and caustic resolutions and communications both to manufacturers and to trade organizations.

In brief the discount policy has been summarized as follows: Class A, or small industrial customers whose business is less than $500 in one order are quoted net. Those having $500 in one order unit shipment are granted a 10 per cent discount; $1,000 in one shipment a 12 per cent discount and those of $5,000 in one shipment become a Class B industrial from then on. Class B industrials are those that have averaged $2,000 per year in the past three years and are given a 16 per cent discount or just one per cent less than all classes of electrical dealers, who receive 17 per cent.

No distinction has been made between ordinary electrical dealers and motor specialists except on annual quarterly discounts which range from 1½ per cent on annual business of $2,500, up to 7 per cent on business of $200,000 and over. Machinery dealers are given the same 17 per cent discount as electrical dealers, and machinery dealers doing $1,000 annually are given 20 per cent discount, which happens to be equal to that of a motor dealer who does $30,000 annually. Manufacturers are also given 20 per cent without discrimination. Manufacturers doing $2,000 annually are given 25 per cent discount, which is better than any discount which a motor dealer can get, even with business of over $200,000 per year. Municipal, county, state, federal government and utilities get 16 per cent discount.

Motor specialists point out that all incentives to sell new equipment have been completely removed by this new policy.

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• Frank Wheeler, vice-president of the Trumbull Company, manufacturers of switchboards and panelboard equipment, made his first trip to the Pacific Coast last month visiting the Trumbull plants in Seattle, San Francisco and Los Angeles.

...in Engineering

Automatic welder which welds seam in oil drums at rate of 200 an hour

Oil Drums Welded Automatically

When Boyle Manufacturing Co., of Alameda, Calif., first set up its large plant for the fabrication of 50-gal. oil drums all of the welding was done by hand with acetylene torches. A large crew of operators was necessary and even with care and inspection the percentage of leaking drums at the point of welding was unsatisfactory. Not long ago the company installed a new automatic welding machine which welds oil drums employing metals of from 12 to 19 gage at a capacity of 250 an hour.

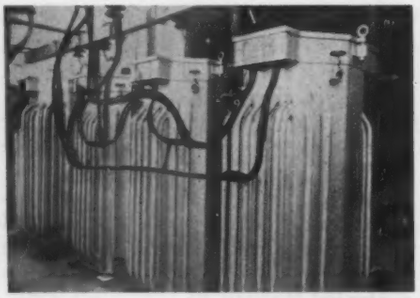
The large sheets of the metal are rolled to the shape of the drums, lifted to the automatic welder by two operators and the seam is welded in a fraction of a minute. The machine is operated usually at about 200 to 210 drums per hour although the capacity is 250. This means four welds a minute.

In order to supply energy to this welder special transformers were built by the Gardner Electric Mfg. Co., Emeryville, for the Light and Power Dept., City of Alameda, which installed them on the customer's premises.

One 333-kva. and three 200-kva. transformers are installed in the bank, reducing the supply voltage from 11,500 to 2,300-460 volt. For the automatic welder operation the transformers were especially rigidly constructed to stand the excessive mechanical stresses caused by the type of load imposed by the welding. The characteristic of the load is the sharp increase of current from the beginning of the weld to five times the normal current at the end of each weld, operating at the rate of four welds a minute.

The electric welds have been found to be freer from defects, neater in appearance and better able to withstand the subsequent pressing operation which is used to make ribs in the shaft of the oil drums for rigidity.

Special bank of transformers installed to serve welding machines at Boyle plant



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Electric Stairs Modernize Store

THE installation of ten new electric stairways at Bullock's, Los Angeles, Calif., Seventh St. and Broadway store, has been completed by the Westinghouse Electric Elevator Co., Los Angeles, providing new conveniences in the large department store's transportation system. The electrical stairways, connecting the first and all intervening floors to the sixth, were installed at a cost of approximately $250,000.

Each unit is constructed in the newest streamline design, using rich hardwoods and metallic striping, and each is equipped with cove lighting. The capacity of each stairway is 8,000 persons per hour. Extreme quietness and safety of operation is assured by a number of new devices which, Westinghouse Co. engineers announced, are being put into operation at Bullock's for the first time.

Work on the installation, which provides inter-floor transportation capacity equal to twelve average capacity elevators, was begun early in July and provided employment for a force of 200 men working in eight hour shifts, twenty-four hours each day.

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...in Lighting

Westinghouse Booklet Tells Eye Story

Importance of good light to good sight in relation to the physiological function of the human eye is the story told in a new brochure, "Old Eyes in Young People," which the Westinghouse Lamp Company has prepared for use in its advertising program for this winter.

How improper lighting injures the delicate mechanism of the eye, thereby contributing to the strain that causes eye fatigue and near-sightedness, constitutes the main theme of the brochure. To make the story easy to understand, the function of seeing is likened to photography.

The story of lighting and seeing is concluded with several simple tests by which the reader may check the adequacy and correctness of lighting in his home. There is the "telephone book"

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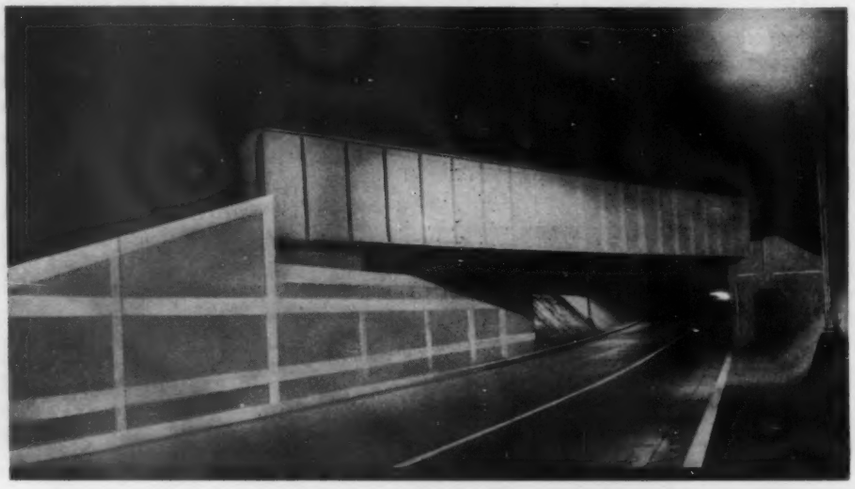
Sodium Vapor Lamps Safeguard Underpass

On either side of this underpass on the main highway near Stockton, Calif., a new sodium vapor lighting unit has been installed to prevent possible accidents arising from inadequate illumination at a place where a driver needs unimpaired vision. That these new units, which give out almost four times the light for the same current as used by the ordinary filament-type unit, are effective light sources is indicated by the fact that this photograph was taken with only a few seconds exposure, using an ordinary camera



test for adequacy of light; the "mirror" test for the presence of glare; and a "check sheet" for showing the correct wattage of lamp to use in home lighting fixtures.

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• OPTOMETRY ties in more closely to the lighting profession each year. Further evidence of this is the election of Dr. E. A. Hutchinson, School of Optometry, University of Southern California, as chairman of the Southern California Section of the Illuminating Engineering Society. Edward G. Neale, of Luminous Structures, Inc., is secretary. The board of managers for the Section consists of these two officers and C. E. Thompson, Westinghouse Lamp Co.; Dr. Arthur E. Hoare, optometrist of Los Angeles; William G. Shirreffs, S & M Lamp Co., Los Angeles; George A. Hill, La Canada; and Lloyd A. Gates, General Electric Co., Incandescent Lamp Department, Los Angeles, who was secretary last year. The first meeting of the year was I.E.S. Day at the Electric Club, Oct. 8, at which Alston Rogers, of the lighting institute at Nela Park, spoke on "Science of Seeing."

Ted Neale, new secretary of the I.E.S. in Los Angeles, is blazing new lighting trails with his Luminous Structures, Inc., builders of glass and steel lighted structures

• A VISIT TO THE UNIVERSAL STUDIOS, Universal City, was a feature meeting of the Illuminating Engineering Society, Southern California Section, Nov. 13, under arrangements made by George Rankin, illuminating engineer, Southern California Edison Co. Ltd. Dinner was had at the Universal City Cafeteria following which a tour of inspection was made of the studios where arrangements had been made to see the sets rigged up for lighting. Visits were also made to laboratories and sound departments. The meeting had a record attendance.

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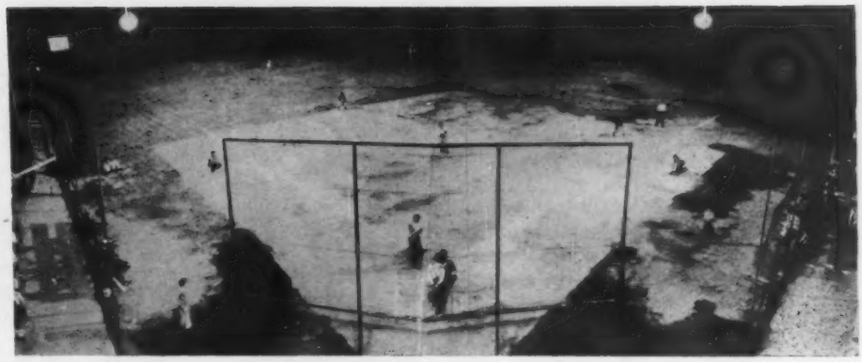
• UNDER 400 FEET of water since 1927 in an Arizona mine, yet now lighting a corner of a home, is the record of a G.E. Mazda lamp reported in a letter from the Red Rover Mine, Phoenix, Ariz.



Bakersfield Diamond Lighted

Like daylight in the cool of the evening makes baseball popular in Bakersfield, Calif., where John Walsh of San Joaquin Power sold an installation of 16 1500-watt and a 4 1000-watt S. & M. floodlights and Contractor R. H. McKee of Oildale made the installation. Seven poles were used to mount the units. The 1500-watt units were played on the field and 45-ft. diamond, while the 1000-watt units act as ceiling lights to keep the ball in view even for high flies. The photo was a snapshot made by the light from the units only

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...in Merchandising

Southern Sierras Has Flat Rate Water Heating

Flat rate water heating service applicable to residential customers where an electric range is installed has been announced by The Southern Sierras Power Co., Riverside, Calif. The rate is variable, based upon the number of residents in the house, the capacity of the tank and the capacity of the heater. It is as follows:

Max. No. Residents in House	Capacity of Tank in Gals.	Capacity of Heater—Watts	Monthly Charge
2	18	1500	$2.00
2	24	1000	2.00
3	30	1000	2.50
4	30	1500	3.00
5	40	1500	3.50
6	40	2000	4.00
7	52	2000	5.00
8	52	2500	5.50
9	66	2500	6.50
10	66	3000	7.00

Special conditions under which the rate is applicable include the requirement of a load-limiting device which will automatically disconnect the water heater whenever the range load exceeds 3 kw. The rate is limited to water heaters sold and installed by the company or to water heaters which meet the company's specifications.

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ELECTRIC KITCHEN DISPLAYS—Two all-electric kitchen displays suitable for installation in power company store or office or in any dealer's store have been made available by Westinghouse. The first is built in a half hexagon, has dummy cabinet work and is 13 ft long and 8 ft. high. It is portable and takes standard Westinghouse range, dishwasher and refrigerator. The second kitchen display is semi-usable for cooking schools and demonstrations. Both are wired for appliances and illumination. Both will be sold at nominal cost.

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Santa's Route Contest Stimulated Sales

The Fort Collins office of Public Service Company of Colorado joined with thirty-five local merchants in a unique "Santa's Route" newspaper advertising contest last year, which contains a selling idea for any other region.

Full page newspaper advertisements on Wednesday, Dec. 13, and Sunday, Dec. 17, announced, "Map Out Santa's Route and Win a Prize!" Shown was a large sketch of Santa Claus with sleigh and reindeer, perplexedly examining a map. Most of the page space was given over to 1½ inch circles—"stopping points" on Santa's route—which were blank except for the name of a merchant, printed in bold face.

The contestant searched the advertising of the participants, and found in each, given in eight-point type, the name of the Santa's item, which was duly written in the proper circle. The completed pages were submitted before Wednesday evening, Dec. 20, and awards were announced on Dec. 22. They were a first prize of $10, second prize of $5; and five $1 awards.

The effect of the contest was to lead hundreds of newspaper readers to scan carefully the advertising of participants, then to go through the procedure of mapping a shopping route. There was a large response to the contest, with definite emphasis given to Christmas sales.

News of Note + + +

Washington Utility Attacks PWA Loan

Suit was filed in the federal court at Couer d'Alene, Idaho, Nov. 20 by the Washington Water Power Co. seeking to enjoin the city of Couer d'Alene from borrowing money from the federal emergency administration of public works to build an electric light plant and a water plant in that city.

In the suit Mayor John Coe, the city treasurer, the city clerk and eight members of the city council are made defendants and a restraining order is asked to restrain the city of Couer d'Alene from issuing any bonds or accepting any public funds for the purposes indicated until a hearing can be had as to an application for an injunction.

The suit attacks the proposed federal loan to the city of Couer d'Alene on the following grounds: misleading statements made at the time of the election on the bond issue proposal; misleading statements by Mayor Coe; alleged violations of the constitution of the state of Idaho in its limitations on debt of municipalities; public works administration unauthorized to give federal relief funds for the building of Diesel engine power plants. It is alleged that no emergency exists that justified advancement of relief funds for a Diesel engine power plant and that such action is illegal and beyond the power of the NRA. The complaint alleges that the fifth amendment to the constitution of the United States and the first section of the 14th amendment to the same, forbidding the taking of property without due process of law, are violated.

Congress under the constitution, it is claimed, has no power to make gifts or grants to projects the purposes of which are to destroy property owned by others. It is further alleged that the project is purely local and Congress is without authority to loan money to it and that Harold Ickes, federal administrator of public works, exceeded his authority. The complaint alleged that the act of Ickes in approving the loan to Couer d'Alene, after being fully warned of the character of the investment, is "arbitrary, unreasonable and a capricious exercise of delegated authority" for the reason that the financial condition of the city of Couer d'Alene did not justify such a loan.

The filing of the suit follows a long period of agitation in Couer d'Alene in behalf of municipally owned light and water plants.

300 Hotcakes Per Minute

When 1,400 men sit down at breakfast at one time, the job of providing them with hotcakes is no small one. At Anderson Brothers mess hall at Boulder City eight cooks turn them out at the rate of 300 per minute on this double battery of electric griddles. Four cooks work on each side. They begin pouring batter from the ends toward the middle. By the time they finish pouring, the first cakes are ready to turn. Corps of waiters then distribute them to the tables

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Sacramento Votes $12,000,000 Power Bonds

With 31,650 affirmative votes, which exceeded the required two-thirds by approximately 17,000 votes, a $12,000,000 bond issue for the construction of a steam plant and distribution system was passed in the territory comprising the Sacramento Municipal Utility District on Nov. 6. The district includes portions of Sacramento and Placer Counties now served by the Pacific Gas and Electric Co.

Negotiations have been opened with PWA for the purchase of the bonds and also with the idea of obtaining a 30 per cent grant if possible. Negotiations for construction of the system and purchase of equipment will not be undertaken until the bonds have been sold.

Union labor officials in Sacramento have started a movement to have the work done by the district itself instead of by contract. No announcement has been made by Pacific Gas and Electric Co. as to what course it will pursue in the case.

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• WINNEMUCCA, NEV., balloted eight to one in favor of a $306,000 bond issue to construct a municipal water and light system. The city contemplates obtaining a PWA loan and grant to finance the construction. The city is now served by the Western States Utilities Co.

E.E.I. to Test Legality of TVA

Authorization for its executives to take steps to determine "whether there are limits under the constitution beyond which the government may not go in using public funds to destroy by competitive construction and operation the existing investments of private capital" has been voted by the Edison Electric Institute.

In a statement announcing the intention to question the legality of the administration's power program Thomas M. McCarter, president of the institute stated that the Tennessee Valley project has been found "palpably unconstitutional" in a legal opinion by Newton D. Baker and James M. Beck, attorneys. His announcement said that the report of these attorneys on the TVA "is a lengthy and convincing opinion, buttressed by citation from decisions of the United States Supreme Court. It holds that the legislation relating to this project and the plan of governmental action set up therein are palpably unconstitutional; that the legislation, if valid, does not authorize much that has either been done by the authority or that it is preparing to do, and that the cooperative actions of the Tennessee Valley Authority and the Public Works Administration forcing sales of property of private utilities under threat of gifts and loans to municipalities are illegal."

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Three Power Districts Lose in California

Three proposed municipal utility districts in various parts of California were defeated in the Nov. 6 election. The Glenn County utility district was defeated by a vote of two to one. The Tehama County district was defeated by two and a half to one. A similar proposal in Pajaro lost by a wide margin.

The first two districts were in territory served by the Pacific Gas and Electric Co. and the third in territory served by the Coast Counties Gas & Electric Co.

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• MURRAY, UTAH, has voted a bond issue of $25,000 to construct an addition to its present municipal electric light and power plant. The project includes the installation of a 426-hp. diesel generating unit in the city's hydro-electric plant. Cost of the installation is estimated at $33,000. Money is to be obtained from a PWA loan and grant.

Construction Starts on $2,000,000 Stations

Two switching stations estimated to cost approximately $2,000,000 are being built by the Los Angeles Bureau of Power and Light for the purpose of sectionalizing the 270-mile, 275-kv. Boulder Canyon transmission line. Preliminary work has started on the two stations, one of which will be located at Silver Lake on the desert 90 miles east of the dam and the second in the vicinity of Victorville.

Contracts for the structural material and practically all of the equipment already have been awarded and the stations will be ready for operation in September, 1935.

The 270-mile transmission line is now more than 60 per cent completed. Work of erecting double-circuit towers on the section from Cajon Pass to Los Angeles will be started in the near future. This is the only portion of the line yet to be erected.

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National Labor Board Rules Against P.G.&E.

Pacific Gas and Electric Co. has been ordered by the National Labor Relations Board to re-employ three workers who are members of the International Brotherhood of Electrical Workers, Local No. 36 at Sacramento and who were discharged in February and March of this year.

The ruling follows a series of hearings before the San Francisco Regional Labor Board and the national board in which the company endeavored to show reasonable cause for the discharge of the employees. The board charged that testimony presented indicated that the employees had been discharged for union activities.

The decision charges that by discharging the employees the company "interfered with the self-organization of its employees, in violation of Sec. 7a of the N.I.R.A., as incorporated in the President's Reemployment Agreement." The board declared its intention to refer the case to the compliance division of NRA unless within fifteen days the company reinstated the men to their former positions.

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Edison Sells Burbank System

Approval of a contract between the city of Burbank and the Southern California Edison Co. whereby the former purchases the electrical distribution system of the latter located within the city has been granted by the California Railroad Commission. The contract calls for a purchase price of $90,000, not including the portion of the distribution system serving Warner Bros.-First National Studios in Burbank. If these studios are included, an additional $70,000 is to be paid. The option to purchase this latter service must be exercised within a three-year period from Sept. 7, 1934.

The Railroad Commission had been asked by the city of Burbank to fix the compensation to be paid for the system, but after a number of hearings the city and the utility reached an agreement on the final price.

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Oregon Companies to Spend $960,000

Three utility companies of Oregon will spend upwards of $960,000 for construction during 1935 according to budgets recently filed with the state public utilities commissioner. The California-Oregon Power Co., Medford, places its proposed 1935 construction expenses at $493.000; Mountain States Power Co., Medford, will spend $403,000; and the West Coast Power Co., Portland, will spend $63,250.

Budgets are filed in accordance with the new state regulatory law and cover expected operating expenditures as well as expenditures for new construction.

●

Urge High Dam For Grand Coulee Project

Efforts to prove the feasibility of immediate construction of a high dam at Grand Coulee through an organized power market study have been instituted by the Columbia Basin commission, which has named C. H. Uden, electrical engineer of Seattle, as its power market engineer.

A survey is being undertaken immediately in an effort to prove that future markets justify erection of a high dam. It is proposed to have this survey ready for the January session of Congress.

●

• WASHINGTON WATER POWER CO. has filed notice of appeal from a judgment for $247,300 rendered against it by a superior court jury in Okanogan County. The judgment was given in favor of the Biles-Colman Lumber Co. which contended that a fire which destroyed its box factory in 1929 was caused by negligence of power company employees thawing frozen steam pipes.

●

• PLANS FOR the creation of a utility district at Vancouver, Wash., were defeated by a vote of 2,159 to 2,099 on Nov. 6. An unofficial tabulation announced immediately after the election had the proposal carrying by 50 votes, whereas the official count showed that it lost by 60 votes.

Ariona Closes Down Parker Dam

Work under way on the Arizona side of the Colorado River on the Parker Dam unit of the Metropolitan Water District aqueduct project was stopped on Nov. 13 on orders of the United States Bureau of Reclamation after new objections to the project had been made by Gov. B. B. Moeur of Arizona. The suspension of work is to continue until the rights of the states involved have been determined.

Gov. Moeur on Nov. 10 declared martial law along the Colorado River on the Arizona side of the Parker diversion dam site. He ordered the state national guard to the area, but recalled the troops before they reached the dam site. His action grew out of the building of a temporary bridge across the river, which, the governor contended, is a direct encroachment upon Arizona's rights. The construction of a pile bridge across the river had been started by the Six Companies, Inc., which has the contract for construction of the Parker Dam for the Bureau of Reclamation.

Although the Metropolitan Water District of Southern California eventually will receive water from the Parker Dam site through the Colorado River aqueduct, the dam is being built by the federal reclamation bureau, with funds furnished by the water district. Gov. Moeur, this year, entered objections to the Parker Dam project, and ordered a squad of guardsmen to the dam site to prevent work being carried forward on the Arizona side of the river.

●

• WASHINGTON POWER SURVEY—Work will start immediately on a survey of present and possible future uses of electric power in the state of Washington, according to the announcement of B. H. Kizer, chairman of the Washington State Planning Commission. The survey will be conducted under the auspices of the State College of Washington. Professor L. J. Smith, head of the department of agricultural engineering, will have charge of the survey. Dean E. C. Johnson, of the college of agriculture and the experiment station, will supervise the survey and he will be aided by Dean H. V. Carpenter, of the college of engineering and Harry L. Garver, rural electric investigator.

●

• A SURVEY of the new Westminster, B. C., municipal electric system will be undertaken with a view to investigating the possibility of building a city-owned power plant. For many years the municipal system has purchased its power from the B. C. Electric Railway Co. on a wholesale basis.

Set Value on Colorado System

Value of the distribution system at Fort Collins, Colo., was placed at $216,500 by a District Court jury sitting in condemnation proceedings brought by the city against the Public Service Co. of Colorado. The price fixed included $5,500 for goodwill and going concern value.

Attorneys for the power company contended during the hearings that the property had a value of $350,351, while appraisers employed by the municipality held that $195,443 was sufficient. Further litigation is deemed likely in view of the disparity that exists between the amounts asked and awarded. Government funds will be made available for the project only after the city acquires title to the property. The case involves a municipal ownership project which was voted last year.

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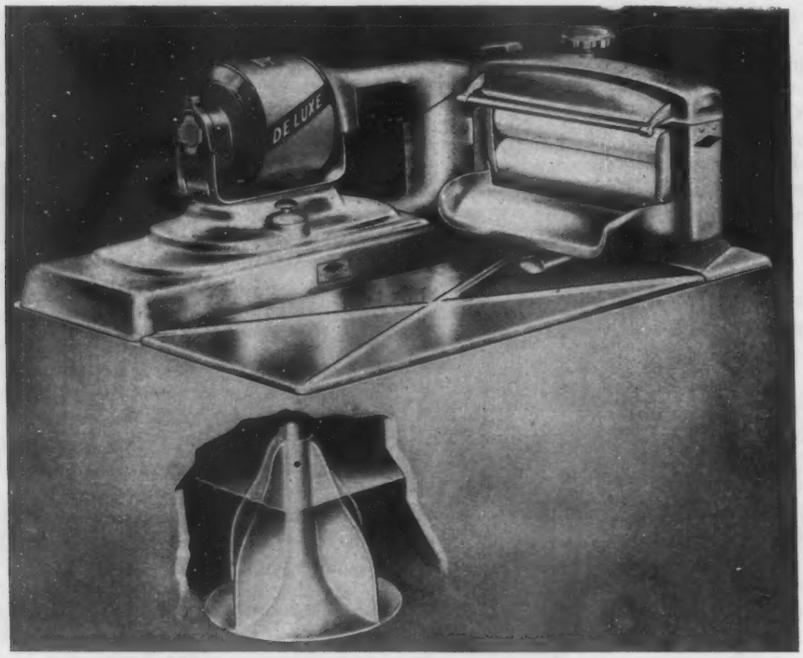
• A. E. CLARKE, manager, Smoot-Holman Co., Inglewood, Calif., has announced the appointment as agents for that company's line of lighting equipment: O. P. Willoughby, Wesco Co., Denver, for Colorado, eastern Wyoming, New Mexico; Thad J. Stevens, Stevens Sales Co., Salt Lake City, for Utah, western Wyoming, Montana and Idaho.

LITTLE GIANT will help dealers



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• Little Giant tray washers give you something besides price to talk about. For it is plain today that dealers have profited more by going out and selling prospects the benefits of electric washers than trying to sell lower price. Now the advance construction of Little Giant offers still greater appeal to the modern housewife who desires to save time, energy and laundry bills.

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A fair price, good margin, and an exceptionally fine service record builds goodwill and profits for Little Giant dealers. Investigate today the new Little Giant tray washer with its "floating power" motor and rigid over all construction. You'll find plenty of sales ideas in the washer that is "built like a battleship and runs like a watch."

LITTLE GIANT, Inc., Ltd.
4222 Hollis St. Oakland, Calif.

LITTLE TRAY WASHER GIANT

BUILT LIKE A BATTLESHIP — RUNS LIKE A WATCH

Los Angeles Requests Valuation of L. A. G. & E.

Plans of the city of Los Angeles for the acquisition of the electrical generating, transmitting and distributing properties of the Los Angeles Gas and Electric Corp. were reported formally to the California Railroad Commission on Nov. 20 in an application asking the commission to fix the compensation to be paid for the corporation's electrical properties. E. F. Scattergood, chief engineer and general manager of the municipal Bureau of Power and Light, said the application is to institute proceedings for valuing the electrical system of the corporation, in conformity with the rights vested in municipalities by the state constitution.

"It is the intention of the Department of Water and Power to negotiate with the company for the purchase of its complete electric generating and distributing system," Mr. Scattergood said.

The application lists the company's Seal Beach generating station and transmission line from the station to the Lawrence St. switching station, the Alameda St. generating station, various substations and miscellaneous equipment.

The city's application to the commission, which carried the signature of John R. Haynes, president of the Water and Power Commission, follows the action of Los Angeles voters on Sept. 27, last, in voting amendments to the city charter designed to facilitate the acquisition of the corporation's electrical properties. The approved amendments include one authorizing the city to borrow from the state or federal government funds to acquire the properties, another authorizing the Department of Water and Power to take over a part of the outstanding indebtedness of the corporation, and a third authorizing the department to retain all employees of the corporation in their respective capacities without regard to civil service requirements.

•

• CONSTITUTIONALITY of the Grange District Power Bill by the Washington State Supreme Court will be tested as the result of the filing of an appeal from a Lincoln County court judgment holding the act to be invalid by attorneys representing the Lincoln County election board and the Washington State Grange. The lower court ruled the measure unconstitutional as the result of a petition of The Washington Water Power Co., Great Northern and Northern Pacific Railways, which sought to restrain the election board from placing on the November 6 ballot a proposal to create a power district in the county.

Oregon Commission to Regulate Service Fees

Citing the public interest in service fees paid by operating companies to management companies and objecting to the basis on which these fees are levied in existing management contracts between The California Oregon Power Co. and Mountain States Power Co., Medford, and Byllesby Engineering & Management Corp., Charles M. Thomas, public utility commissioner of Oregon, issued an order Nov. 2 abrogating these contracts as of Jan. 1, 1936 and authorizing new ones to be made in conformance with certain broad principles as interpreted by the commissioner.

The four principles on which these service charges must be based as enunciated by the commissioner are:

1. That the services covered therein are actually to be rendered;
2. That only such services are to be furnished as are valuable to the operating company;
3. That all charges for such services are to be made on the basis and in the form provided for in the contract approved by this commission;
4. That all payments for services furnished by such management and engineering company shall be subject to the inspection of the commission's staff.

The findings of fact included a statement that many services of value were rendered the Oregon companies by Byllesby Engineering & Management Corp., not only in specific values that could be itemized but in intangible values arising out of retaining a trained staff to render service or counsel in many phases of the business. The questions involved were what these fees should amount to and on what basis they should be charged, with a clear indication that the gross revenue basis was not equitable in the judgment of the commission.

The findings further included the fact that certain officials of the operating companies received a part or all of their salaries from the management company paid out of the fees received from the operating companies. The order directs that in the future all salaries of these officials shall be paid by the operating companies.

•

Pasadena's Boulder Power Contract Modified

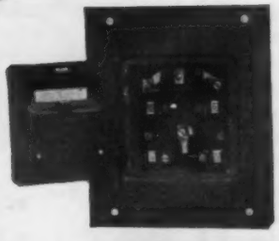
Approval of a supplemental contract with the federal government in which the city of Pasadena is granted three years time in which to take its full amount of power from Boulder Dam has been voted by the city Board of Directors. Coincidentally, C. W. Koiner, city manager, announced that the city is not going into the electrical appliance merchandising business, setting at rest reports that the Municipal Light and Power Department, in order to increase its sales of power, would stock and sell electric ranges and other electrical appliances to citizens at reduced rates.

Rather, Mr. Koiner indicated, the city will consider plans for a campaign to encourage the sale of appliances by private business houses. Under the terms of the revised power contract, the city is required to take only 55 per cent of its Boulder Dam power allotment the first year that such energy is available; 70 per cent the second year; 85 per cent the third year and 100 per cent the fourth and each subsequent year.

•

• WILLAPA ELECTRIC CO., serving Raymond, South Bend and rural areas in southwestern Washington, has been ordered by the Washington State Department of Public Works to reduce rates to the extent of $10,717. The department order declared services of the holding company, Federal Light & Traction Co., were "detrimental rather than beneficial" and cancelled a 3 per cent management fee.

The New Square D
SERVICE ENTRANCE SWITCHES
anticipate
FUTURE LOAD REQUIREMENTS



New in design, the switches illustrated are typical of many modern products and of the progressive engineering of the Square D organization. In their proper application these Square D switches provide modern front operated, flush mounting, service entrance switches. They squarely meet today's demand of contractors for flexible entrance switches with ample provision for tomorrow's entrance load requirements.

Illustrated above (in open and closed positions) is the Square D rotor disc type, front operating, flush mounting service entrance switch, available in 30 to 100 amp. capacity. Shallow cabinet and adjustable interior permits flush mounting without necessity of furring walls. Switch mechanism is semi-quick make and quick break.

Above is illustrated Square D dead front pull-out main service entrance switch of the 60 amp., fuse-break type. When cover is removed circuit is disconnected. No live parts exposed. Shallow type cabinet and adjustable interior. A Square D provision for range and water heater circuits.

SQUARE D
ELECTRICAL EQUIPMENT

SQUARE D COMPANY
ELECTRICAL EQUIPMENT INC.
LOS ANGELES · SAN FRANCISCO · DENVER · HOUSTON

Grange Power Bill Defeated in Oregon

Oregon's Grange Power bill was defeated in the November 6 election by the comparatively narrow margin of 15,000 votes out of a total of nearly 257,000 votes cast. Twelve counties, or one-third of the counties in the state, returned a small favorable majority, but the measure lost decisively in the other two-thirds of the counties including Multnomah, in which is situated the city of Portland.

The measure came to the ballot by referendum from the 1933 legislature, which passed it in apparent compliance with the mandate of the people in the 1932 general election expressed in a constitutional amendment opening the way to state owned power. The measure just defeated provided machinery for the election of a state power commission of three members who would have almost absolute authority to build power plants, transmission and distribution lines, condemn existing systems, and operate such acquired properties, all of which would be exempt from taxation. Machinery was also provided for the voting of $60,000,000 of general obligation bonds, which, if voted, could be spent by these three commissioners with practically no restrictions and without any possibility of review by the court.

Proponents of the measure argued that the act was necessary to put the state in position to contract for purchase of Federal power from the Bonneville project now under development. Opponents, beside those who did not desire to put the state in the power business, saw grave danger in the extreme powers granted to the commission, rejecting the idea of setting up this machinery with so few safe-guards, and foreseeing the loss of tax revenues through the possible acquiring of existing tax-paying utilities.

•

Town Reverses Vote on Municipal Ownership

The city council at Rifle, Colo., a small farming community on the west slope of the Rockies, unanimously voted for municipal ownership late in September. October 30, taxpayers went to the polls and vetoed the project by decisive majorities.

During the intervening weeks, Public Service Company of Colorado officials engaged in an educational campaign at Rifle, calling attention—mostly by personal contacts with leading business men—to the fact that nineteen Colorado towns have tried municipal ownership and returned to service by privately-owned utilities; that Debeque, a neighbor of Rifle, operated a municipal power plant for seven years and abandoned it in 1930 after costly experimentation; that the two municipally-owned plants at Burlington and Meeker, Colorado, which were exhibited as sterling examples of efficiency, charged much higher rates than now exist at Rifle; that Public Service Company of Colorado light and power schedules locally will be as low, Nov. 15, as those promised by public ownership boosters.

Capstone of defeat for the Rifle enterprise came when it was revealed that $75,000 of income warrant bonds would not reach complete amortization until at least five years after the proposed 500-hp., high-speed Diesel engines had outworn their guaranteed life.

Only real estate owners holding receipts for 1933 taxes were allowed to vote. Bonds were defeated 93 to 60; municipal ownership, 120 to 90—a sharp contrast to the situation that existed thirty days earlier when Rifle sentiment was almost solidly in favor of the two measures.

•

• American Circular Loom Co. has appointed Fred Staible as manufacturer's agent for the Denver, Colo., region.

WHERE TO BUY . . . IN THE WEST

LAPP
Line Post
Insulators

Lapp Line Post Insulators eliminate radio interference due to both dirt and electro-static conditions.

Write for Bulletin No. 112 describing and cataloguing these insulators.

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for
• *Safety*
• *Strength*
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Assured Quality
OAK
Brackets and Pole Steps
LOCUST PIN COMPANY
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KEARNEY
TRIP OUT
FUSE SWITCH

Point pressure contacts—outage indicating—air gap separation of contacts—no cartridge burnouts—positive and accurate performance.

Write for Latest Bulletin

JAMES R. KEARNEY CORPORATION ST. LOUIS, MO.

• Bureau of Power and Light, Los Angeles, has acquired a new piece of property at 59th and Vermont Sts., in that city, upon which it intends to erect a new district office. The present office, near that location, is crowded and inadequate. Therefore the new office will provide additional space for office facilities as well as a large display floor upon which the commercial department will place a complete display of electrical appliances and a model electric kitchen. Plans call for completion about Jan. 1, 1935.

• Contract for the purchase of lead covered cable amounting to $108,966 was awarded on Nov. 15 by the Los Angeles Board of Water and Power Commissioners to the General Cable Corp. The concern recently established a plant in Los Angeles for the manufacture of copper conductor for the municipal Bureau of Power and Light's Boulder Dam transmission line. The supply of lead covered cable will be used for municipal power bureau construction purposes and to replenish warehouse stock.

WHERE TO BUY . . . IN THE WEST

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Made from

Copper Bearing Steel

No known failures in nine years

PACIFIC WIRE ROPE CO., LOS ANGELES

"CRUCIBLE Copperbond"

Made by the "Controlled Molten Welding Process"

Easy Driving — Long Life — Copper Welded to Steel

NON-RUSTING

Fabricated in California by the Kortick Mfg. Co. from Genuine "Crucible Copperbond" Hot Rolled Rods, produced by Crucible Steel Co. of America.

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Underground Transmission

Without Conduit

Note the air and moisture proof flexible coverings. Sealtite represents a distinct advance in parkway cable construction. It is more pliable than any other underground cable . . . and costs are considerably lower.

Write for booklet offering suggested uses and explaining long life.

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Parkway and Airport Cable with Maximum Flexibility by

PROVIDENCE

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For Telephone and Telegraph Lines

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LOS ANGELES - SAN FRANCISCO

Bone Bill Extends Field of Municipalities

The Bone Power Bill, a referendum measure to allow cities to sell electric power outside their corporate limits, was passed by voters of the state of Washington by a majority of approximately 30,000 votes. Major support for the bill came from western Washington, in which the Seattle and Tacoma municipal systems operate. Each of the twelve counties in eastern Washington served by The Washington Water Power Co. returned a majority against the bill.

The measure was first placed before the voters in 1924 as an initiative and defeated by a majority of 70,000.

J. D. Ross, superintendent of the Seattle municipal system, hailed the measure as an encouraging sign for his proposal to expand the Seattle system's operation throughout the state through the purchase of properties of the Puget Sound Power & Light Co.

Frank T. Post, president of The Washington Water Power Co. and one of the most prominent attorneys in the state, in a speech before the Spokane County Bar Assn., declared that the measure in his opinion was unconstitutional. "The framers of our state constitution did not contemplate a socialist commonwealth," said Mr. Post. "If proposals were made for the state to go into the business of making flour, almost any attorney would say immediately that it was unconstitutional. From the true legal standpoint there is no difference in manufacture of flour and manufacture of power."

Mr. Post cited rulings of highest courts of the state of New York and Kentucky to the effect that cities have no legal right to acquire properties outside their limits unless such property is intended to serve directly such cities. He contended that if Seattle and Tacoma buy power plants outside of their boundaries, to produce for profit, and the power does not go to serve the residents of such cities, the purchase is absolutely illegal.

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• Too Much Boulder Power—Modification of its contract with the Federal government for purchase of electrical energy to be generated at Boulder Dam is to be sought by the city of Glendale, Calif., on order of the city council. The council has instructed the city attorney to request the Department of the Interior to amend its contract so that the city will not be required to take its maximum allottment of 70,000,000 kw.-hr. of energy per year because, according to the council, this is considerably more than can be used. Only 40,000,000 kw.-hr. were used during the last fiscal year, according to council records.

• RECONSTRUCTION of the power house at the Premier Mine near Stewart, B. C., which was destroyed by fire recently with a loss of $500,000, will be undertaken immediately. A Pelton water wheel at the power house was the only item of equipment saved from the fire.

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HOLIDAY LIGHTING

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Pilgrims

Pilgrims to the recent Shrine Ceremonial held at Boulder Canyon included L. L. Conrad (left) and W. B. Frampton of the Southern California Edison Co., Ltd., and W. F. Greimes, head of the Radio Interference Bureau of Los Angeles. Otto K. Olson, prominent L. A. electrical contractor, supplied spectacular lighting effects for the occasion

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• C. F. PITTMAN, manager of the Motor Division of the Industrial Department of the General Electric Co., Schenectady, N. Y., recently visited Pacific Coast offices of that company.

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• GEORGE S. TIVY, for the last twelve years Pacific Coast representative of the Emerson Electric Mfg. Company of St. Louis, with headquarters in Los Angeles, has resigned following a change in policy whereby the Emerson company has discontinued direct factory representation in this territory.

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• GEORGE H. WATSON, Pacific Coast manager for Manning-Bowman & Co., made a hurried trip east to the factory in November, preparatory to the Christmas distribution of the company's new matched appliance service.

Drury and Tritle Receive McGraw Awards

Two national electrical association heads have been selected as recipients for the James H. McGraw Award for 1934. Walter J. Drury, chairman of the executive committee of the National Wholesalers Association received the electrical wholesalers medal and John S. Tritle, President of the National Electrical Manufacturers Association, received the electrical Manufacturers medal.

In each case the award was based upon the service to their industries which these men contributed in guiding them through the struggle for self-government under the codes.

•

W. M. MCCAULEY, sales manager of the Railway & Industrial Engineering Co., of Greensburg, Pa., was a visitor to the Pacific Coast in connection with bids entered by his company for the Boulder Dam and Grand Coulee projects. While on the coast he visited Los Angeles, San Francisco and Seattle representatives of his concern.

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• HOWARD W. FLYE, San Francisco manager of the Aluminum Co. of America, reports a successful trip through the East. Interesting is his comment that the railroads of the country are definitely committed to a modernization program utilizing the light weight, aluminum alloy construction for new, high speed equipment by which rail transportation agencies hope to recapture passenger traffic.

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• PAUL A. DOUDEN, Denver, Colo., has been appointed manufacturer's representative for the Triangle Conduit and Cable Co. in the Rocky Mountain area.

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• JAMES SMYTHE PLUMBING & HEATING CO., Spokane, Wash., the General Electric appliance store in that city, has announced as manager of the appliance department Mr. Orput, formerly of King & Orput, Inc., Portland, Ore.

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• Because we are specialists in the transformer field we can manufacture transformers better and at a saving to our customers. Twenty-five years of experience enables us to build reliable transformers to meet every specification.

We have equipped our modern plant to render the finest transformer service in the West, both for economical repairing and for quick order filling on new transformers in all voltages and sizes.

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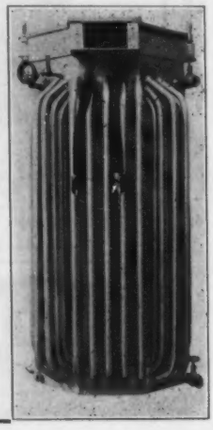

...about the Trade

General Cable Corp. Announces Changes

ALBERT D. WILLIAMS, Pacific Coast manager of the General Cable Corp. with headquarters in San Francisco, has been transferred to the New York office in an executive capacity. His new responsibilities will be varied but a good deal of his time will be involved in customer relations work.

Mr. Williams came to the Pacific Coast in 1930 from the Eastern offices of the General Cable Corp. He took an active part in the affairs of the electrical industry, serving as a director of the Pacific Coast Electrical Bureau and as a member of the executive committee of the Pacific Coast Electrical Association.

HOWARD E. EAGLESTON has succeeded Mr. Williams as Pacific Coast manager. His responsibilities will include all sales activities in the states of California, Oregon, Washington, Idaho, Montana, Arizona and Nevada. Mr. Eagleston has an extensive background of experience in manufacturing, selling and merchandising in the wire and cable field. The Pacific Coast territory is not new to him as in recent years he has spent considerable time on special sales assignments here.

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• SHEARER ELECTRIC, INC., known as "Nevada's General Electric Store," 209 North Virginia St., Reno, announced change in ownership and management on Nov. 1. Jack M. Howell assumed sole ownership and operation of the company. Thomas Moltzen, store manager, continues in charge of the electrical contracting department and Sam Sinnicks and Jay Davis as salesmen. The company also has a branch store at Carson City.

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• COLVIN-TEMPLETON, INC., distributors and dealers for Westinghouse electrical appliances in northern California, have consolidated their sales, display, wholesale and warehouse facilities at their former location at 871 Mission St., San Francisco, Nov. 1. They will close the Sutter St. sales and display rooms which they have maintained for some time. The larger facilities available at 871 Mission St. will enable them to warehouse, carry on their wholesale and retail business, run their sales crews and conduct their entire business under the one roof. The firm has a number of subdealers throughout northern California.

•

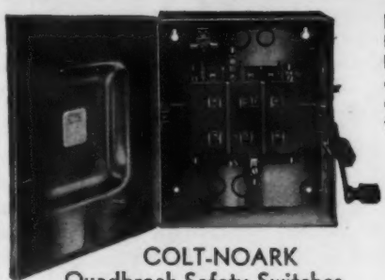
• APEX ROTAREX MANUFACTURING CO., with factory and general offices at Oakland, Calif., has announced the removal of its Los Angeles headquarters to 2519 West Seventh St., telephone Exposition 9231. Mrs. L. A. Prather is in charge of the display room in which a complete display of the company's line of washers, ironers, cleaners, and refrigerators is maintained for use of southern California dealers.

• C. R. HUNT, 239 Rialto Bldg., San Francisco, has been appointed representative for Washington, Oregon, California and Arizona for the Allied Mercantile Co., of 11 East Runyon St., Newark, N. J., manufacturer of the new "spring action" plug caps and current caps, claimed to be the first revolutionary change in attachment plug caps in 25 years. The spring action in the prongs of the cap itself assures positive contact in any type of convenience outlet even though the contacts in the latter are old and worn.

•

• CALIFORNIA REFRIGERATOR CO., 1077 Mission St., San Francisco, according to Clarence F. Pratt, its president, has just installed a refinishing plant for refrigerator cabinets in connection with the large stock of repair parts and refrigerator accessories already carried. An additional show room has also been added for the display of second-hand and reconditioned electric refrigerators.

COLT-NOARK
SWITCHES - MOTOR STARTERS - FUSES



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Quadbreak Safety Switches
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Greater safety, longer wear, more dependable service. Their four point breaking mechanism reduces the arc to a point where it is scarcely noticeable. Ample finger room for wiring. Equipped with safety type door and quick-make and quick-break mechanism.
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NUBLADE TYPE C SAFETY SWITCHES
TYPE D SWITCHES
MOTOR STARTING UNITS
METER SERVICE SWITCHES
COMBINATION RANGE AND ENTRANCE SWITCHES
RENEWABLE AND NON-INDICATING FUSES
FUSE ACCESSORIES
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...about People

Hamilton Gets New Edison Position

Frank S. Hamilton, district manager for the Southern California Edison Co. in Fullerton, Calif., since 1927, has been appointed to the company's service investigation department with headquarters in Los Angeles, according to the announcement of W. L. Frost, Edison vice-president. Harry E. Welsh, supervisor of the commercial cooking sales division of the company, will succeed Mr. Hamilton as Fullerton district manager. The changes were effective Dec. 1, 1934.

Mr. Hamilton has been engaged in the electrical service industry in Southern California for many years. He entered the industry in 1906 with the Mt. Whitney Power & Electric Co. at Visalia. During several years following 1906 Mr. Hamilton held a number of posts with the company and continued his service in the valley territory after the Mt. Whitney Power & Electric Co. was acquired by the Edison company in 1917. He was engaged in the power engineering branch of the service for some time at Delano and Tulare, and in 1921 was appointed district manager in charge of the Hanford territory, later being transferred to the Fullerton district.

Mr. Welsh became a member of the Edison organization in 1918, being first engaged in the Santa Monica district in connection with domestic range sales and then in the power engineering section. Because of his special qualifications and experience gained prior to joining the Edison company, Mr. Welsh in 1929 was transferred to the company's commercial cooking sales division. In January of this year he was appointed supervisor of the commercial cooking section, having direct charge of that activity.

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• DR. G. W. ALLISON, sales representative for the Edison Electric Institute on its broadened merchandising and trade coordinating program, was a visitor to the West during the past month. He filled many engagements in various cities along the road of his tour, addressing both dealer and trade groups and consumer audiences. Although on a hurried trip this time he promises another visit this February.

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• JOSEPH MORRIS was appointed credit manager at Westinghouse Supply Co., San Francisco, effective Nov. 1.

Lisiecki Is Graybar Merchandising Manager

JOHN J. LISIECKI, who has been associated with the Graybar Electric Co., Inc. and its predecessors in Seattle since 1907, has been named merchandising manager for the company in the Pacific Northwest.

Born in Brooklyn, N. Y., in 1893, Mr. Lisiecki was first employed by the New York Telephone Co. His first position with the Western Electric Co. in Seattle was in the installation department and later in the telephone sales department. From 1920 to 1923 he was in the Spokane branch of the company and since that time has been in Seattle.

Coincident with the appointment of Mr. Lisiecki to his new position, the Seattle office of the Graybar company announced the adoption of a policy of selling a complete line of electrical appliances, featuring nationally known and advertised merchandise, all of which will carry the Graybar tag.

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• BENJAMIN F. PEARSON, veteran official of the Southern California Edison Co., who retired from active service of the company Jan. 1, 1934, after thirty-eight years as a member of the organization, has been elected president of the Los Angeles Metropolitan Symphony Orchestra Association. Mr. Pearson is also president of the Civic Music and Art Association and is a member of the Los Angeles City Planning Commission.

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• J. M. GAYLORD, chief electrical and mechanical engineer, Metropolitan Water District, presented to the Electric club of Los Angeles, Monday, Nov. 19, an illustrated talk on the progress of the construction of the Metropolitan Water District Aqueduct. The talk was illustrated by two reels of motion pictures taken during the construction work. H. H. Cox, superintendent of receiving and distributing stations, Bureau of Power & Light, was chairman of the day.

• S. J. MARSH, general sales manager of the Conlon Corp., manufacturers of washers and ironers, recently returned from an extended trip throughout the West calling on Conlon distributors in Denver, Butte, Spokane, Seattle, San Francisco, Salt Lake City and Pueblo. Additional distributors have been announced by him in Idaho, Montana, Oregon and Washington.

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• RAY A. EDWARDS, safety engineer for the San Diego Consolidated Gas and Electric Co., who for the past year has been editor of the publication of the Public Utilities Section, National Safety Council Inc., entitled "Public Utilities Safety", has this year been appointed publicity committee chairman for the Council by the new executive committee.

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• L. R. COFFIN, vice-president of the Puget Sound Power & Light Co., and president of the Northwest Electric Light and Power Association, attended the P.C.E.A. meetings during a recent trip to San Francisco.

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• A. E. "BERT" JOHNSTONE, city electrical inspector, San Diego, outlined for the San Diego Electric Club at the meeting of Tuesday, Nov. 27, plans of the Southwestern Section, International Association of Electrical Inspectors, for its convention in San Diego next year during the California-Pacific International Exposition.

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• H. P. WILSON, active figure in utility development in California for many years, died Nov. 24 at Alexandria, Va. Mr. Wilson organized the Western Power Corp. of California, a holding company which consolidated with the Great Western Power Co. and the San Joaquin Light & Power Corp. He was head of this company until 1925 when it was sold to the North American Co. In addition, he had extensive interests in the light and power industry.

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F. J. CRAM, for many years connected with the former Electric Appliance Co., wholesaling concern in San Francisco, died at his home in Oakland early in October. He was the father of Herbert Cram, Hotpoint range representative.

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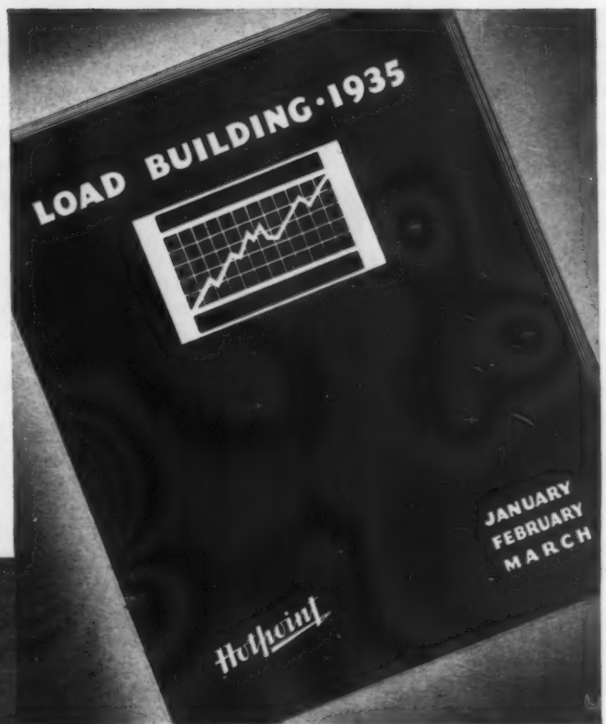
• DONALD C. McMILLAN, city engineer at Ventura, Calif., for several years past, has been appointed city manager there, succeeding A. E. Stockburger, who resigned the office to become California State Finance Director.

A New Load Building Plan for 1935

Start Now to *plan* your load-building activities for next year by looking over Hotpoint's new program covering planned activity for every month. This comprehensive *plan* answers the need for adding profitable revenue progressively and continuously. Utility executives know that the electric range and water heater head the list for quick and profitable load building. Now Hotpoint gives you a complete merchandising set-up to do the job.

A Complete Program, embracing planned activity for every month of the year, is the chief feature of the new Hotpoint Plan. Every utility executive interested in increasing revenue for 1935 should see the Hotpoint Plan.

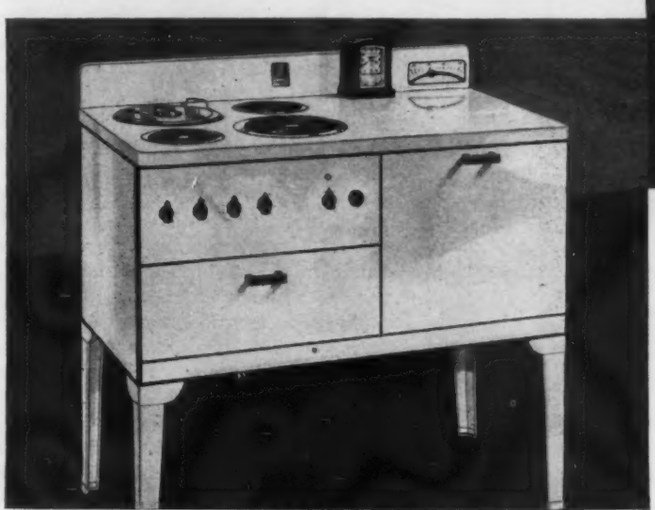
Ready Now. The first portfolio of the program, outlining plans for clearance sales, replacement activity, employee campaigns, during the months



of January, February and March, is now ready. All plans are readily adaptable to your individual requirements.

Get in touch with the Hotpoint representative in your district at once and investigate this great and timely load-building plan.

EDISON GENERAL ELECTRIC APPLIANCE CO., INC.
5612 West Taylor Street, Chicago



THE TRIUMPH, *Hotpoint's price leader, abounds in quality, style, capacity. It has Hotpoint features never before offered in a range of such low price.*

★ Hotpoint ★

ELECTRIC RANGES AND WATER HEATERS

...in Western Business

Editor's Note: Because many factors influence the output of electrical power and the sales of electrical appliances, apparatus and supplies, ELECTRICAL WEST *will carry as a regular feature a page summary of conditions in various industries whose business conditions directly and indirectly affect the electrical industry. These reports are compiled from reports from banks in the principal Western cities, our own correspondents, and reports of the Twelfth District Federal Reserve Agent.*

General

Business and industrial activity for the far Western states reached a peak in August and has declined moderately since that time. Production in major industries receded during October, lumber, flour milling, electric power production and petroleum accounting for the recession. On the other hand building, both private and public, expanded sharply and retail trade held to the high levels of September. Car loadings continued the downward trend which started in July.

All of these factors brought a drop of 2.5 points in the Wells Fargo Bank & Union Trust index of Pacific Coast business activity. The index for October registered 68.3 per cent, based on the 1923-25 level as equaling 100. This compares with 70.8 in September, 72.9 in August and 64.6 in October, 1933. Thus the improvement over conditions a year ago continues to hold. Bank of America's index for the same region declined 3.6 points from September to October.

National business as recorded by the *Business Week* index stood at 58.2 on November 24 as compared with 56.8 on October 27 and 60.6 at the end of November last year.

Agriculture

Widespread rains in October and November helped the general outlook for the farmer. Range feed and water conditions were improved; fall-sown wheat germinated and the soil was prepared for winter plowing.

Marketing of crops in this area was not as active during October as last year. Prices were slightly lower than in September but were still 28 per cent above October, 1933. Farm income held above last year's levels even though prices and crops sold were off somewhat. In the Pacific Northwest marketing of wheat has been slow because farmers have been hoping for an export-subsidy plan similar to that of last year.

Cotton production in both California and Arizona exceeded that of last year by substantial amounts, being 250,000 bales and 104,000 bales for the two states respectively. Prices are 25 per cent higher than last year. California's rice crop registered a gain of 27 per cent over 1933. The sugar beet output for the Twelfth Federal Reserve District was only 60 per cent of last year's crop due to the failure of the crop in Idaho and Utah. Apple shipments in the Pacific Northwest were 50 per cent ahead of last year; pear shipments 20 per cent ahead. Grape shipments have been completed with prices higher. Income from citrus fruits in California and Arizona has been 33 per cent ahead of last season. Prices of dairy products continue their upward trend.

These factors, practically all of which are favorable, are contributing to the general well-being of the farmer and to the markedly increased purchasing power being displayed in the rural areas of the far West. The farmer is in a buying mood for the first time since the start of the depression and trade is showing the effects.

Industry

Industrial production holds at about the same level as last year although somewhat below September. In California industrial employment and payrolls (exclusive of canning) increased during October, as did those of Oregon.

CONSTRUCTION: Success of the Federal Housing program in the far West is indicated by the sharp upward turn in building permits. Contract awards for both Federal and non-Federal works increased. Permits for privately financed construction were double those for September. Fifty-five cities in eight states reported an increase of 72 per cent in permits over September and 35 per cent over October, 1933. The increases were general throughout the territory and what is most significant, were heaviest in the rural areas. In the San Francisco area it is reported that approximately 5 per cent of the applications for modernization loans cover electrical installations of one sort or another.

LUMBER: Lumber activity did not come up to seasonal expectations. Operations in the Western pine regions expanded but in Douglas fir producing areas there was not the customary activity. New orders were well maintained during October but shipments fell to the lowest figure since July.

PETROLEUM: California production of crude oil continued at the same levels as in September, which is about 15,000 barrels daily in excess of proration. Gasoline stocks have been reduced at the expense of refinery curtailed operations. More Pacific Coast oil companies joined the marketing agreement during October, with consequent strengthening of code operations.

MINING: With the exception of copper, which remains stationary at 9 cents, metal prices declined moderately, presumably in an effort to stimulate buying. With Congress convening in January, there is considerably speculation as to what further legislative steps will be taken with silver. The Western silver senators are split on a program. Activity in gold producing centers continues. In Arizona considerable development work is being undertaken. California mines continue to expand. In both Colorado and British Columbia mining operations have resulted in new load for the power companies together with some transmission line extensions.

Trade

Wholesale trade increased during October, apparently in expectation of heavy Christmas buying by the public. All lines showed an increase of 5.4 per cent over September and a 21.5 per cent increase over October, 1933. The cumulative total for the year is 21 per cent ahead of 1933. Automotive supplies, agricultural implements, drugs, groceries, hardware and electrical supplies showed increases; furniture sales were unchanged and shoes and paper declined. Electrical supply sales were 11.8 per cent ahead of September and 20.8 per cent ahead of October last year. Appliances account for the major increase although the movement of wiring supplies has shown an upward trend along with building construction.

Department store sales, which are an index of general retail trade remain at the highest level of the year. There was no change from September. Expansion of sales in California offset moderate declines in the Pacific Northwest and Mountain states. Net sales for October were 20.1 per cent ahead of the same month of last year. Aggregate automobile sales were the highest for any October since 1930.

Electrical appliance sales are beginning to show the stimulation in northern California which was anticipated when the ½-off plan of the utilities in that area was announced. Wholesalers and retailers report increasing interest in heavy duty appliances as the public begins to appreciate the real meaning of the offer.

The increase in wholesale commodity prices shown by national indices for the first half of November was not reflected by prices in this region. However price stability is increasing.

Future

Western business anticipates the best Christmas season since 1930. The outlook for the farmer continues promising. Aside from this it is anybody's guess as to what the first quarter of 1935 will bring.

5 Grades

TO EXACTLY MEET ANY NEED

ROEBLING RUBBER-INSULATED AND BRAIDED WIRES AND CABLES

Code, Intermediate, 30%, 40%, and 35% Performite...Roebling Rubber-insulated Wires and Cables are available in all these grades to meet a wide range of requirements.

Over 60 types of Roebling Electrical Wires and Cables are made. Large stocks of many of the standard types are carried at the warehouse points listed below.

JOHN A. ROEBLING'S SONS CO. OF CALIFORNIA

San Francisco Los Angeles Seattle Portland

ONLY A FINE PRODUCT MAY BEAR THE NAME ROEBLING

...in New Equipment and Appliances

Personalized Appliances

Monogrammed appliances is the answer of the Westinghouse Electric & Manufacturing Co. to dealers who wish to offer something individualistic in electric appliances to their customers. An engraved initial, taken from a card of monograms in the dealer's stock, can be placed on a group of personalized appliances the moment of the sale. The group of appliances in which this idea is featured consists of the Menu Master Grill, the Waffle Servi-Set and the Sentinel Adjust-o-Matic Waffle Iron. Each of these appliances are styled to appeal to those who desire ultra-exclusive design and for dealers who have the urge to sell certain electric goods out of the class of ordinary merchandise.

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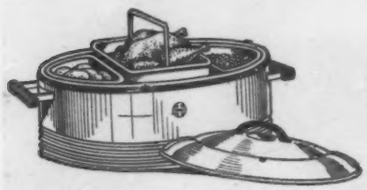

Utility Electric Roaster

An electric roaster that not only roasts meat and prepares vegetables, but also bakes pies, cakes, and biscuits and cans 7 pint jars by the cold pack process; and large enough to handle a 10 lb. turkey, has been placed on the market by The Swartzbaugh Mfg. Co., Toledo, Ohio. The equipment consists of a removable inset and three other pans with a body finish of green and a chromium plated cover.

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Modernized Percolator

An electric perculator made to harmonize with the setting in the Westinghouse "Home of Tomorrow" is being placed in the market by the Westinghouse Electric & Manufacturing Co. The perculator is of slender modern design finished in lustrous chrome.

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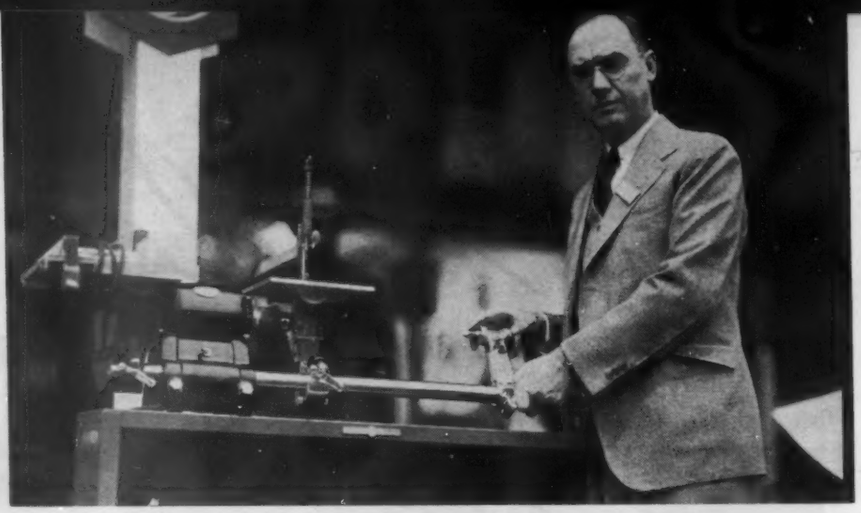

New Sales With Electrified Home Workshop

To capitalize upon the universal desire for boys to "make things" and for that matter upon the hobbies of grownups, the General Electric Specialty Appliance Sales Department has developed this new electrically-driven Home Workshop. It consists of a compact combination of tools—saws for wood and metals, with tilting saw table, lathe, sander disc and jig saw. A model of efficiency that will increase the productivity of many an American basement workshop, it will retail for $99.50.

Metal Coffee Maker Units

A new line of Sunbeam coffee makers and servers, to be known as the Maxwelton Braes Models, are being introduced to the Christmas trade by the Chicago Flexible Shaft Co., Chicago, Ill. The servers, styled in the modern

manner, are chrome-plated inside and out, keeping coffee hot during an entire meal. Coffee is made by inserting a coffee basket in the server containing hot water, a method which gives a delicious brew of coffee. The electric table stove, coffee basket inserts, and servers are individual units that can be used and sold separately or in combinations. Complete outfit of units retail for $6.95 and servers alone as low as $2.25.

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New G. E. Water Heater

A new automatic electric water heater, combining style and compactness with unusual capacity, has been announced by the specialty appliance sales department of the General Electric Co. The heater is of baked white enamel, finished and styled to harmonize with the new low-priced G-E companion range and G-E Liftup refrigerator, having the same height of 36 inches. It has a capacity of 30 gallons and is equipped with a Calrod self-cleaning unit that can be had in nine sizes ranging from 500 to 3 000 watts. The GW30al heater is priced at $63 f.o.b. factory.

•

Low Price Ironer

Presenting a new value in Ironrite ironer, the Ironrite Co. of Detroit, Mich., has just brought out its lowest price model, No. 34. The new model has the features of the higher price models such as two open and free ends of the shoe, feedboard, and roll. It retails at $94.50.

•

Streamlined Vacuum Cleaners

Streamlining, designed to facilitate cleaning as well as to present an attractive appearance, is featured in five new cleaners just introduced by the General Electric Company's Merchandising Department, Bridgeport, Connecticut. Better cleaning of the more inaccessible corners of the average home is made possible through a practical design incorporating a "Spot-Lite." The five models range in price from $17.95 to $76.50.

Speedy Electric Toy Lures Any Age Boy

Electric trains, the toy father buys for the kiddies but plays with himself, have received an added sales impetus this Christmas season by the introduction of a scale model of the new Union Pacific streamline train. The Lionel Corp., New York City, is manufacturing the model, featuring a high speed electric motor and a new high speed model builder's track.

WHERE TO BUY IT IN THE WEST

Air Conditioning
Frigidaire Corp.
General Elec. Co.
Graybar Elec. Co., Inc.

Anchors, Guy
James R. Kearney Corp.

Appliances, Household
Apex Rotarex Mfg. Co.
Edison Gen. Elec. Appliance Co., Inc.
General Elec. Co.
General E'ec. Supply Corp.
Graybar Elec. Co., Inc.
Lindemann & Hoverson Co., A. J.
Malleable Iron Range Co.
Mary Dowd Reardon Studios Ltd.
Swartzbaugh Mfg. Co.
Westinghouse Elec. Supply Co.

Boxes
General Cable Corp.
General Elec. Co.
Russell & Stoll Co.

Brackets, Wood
Locust Pin Co.

Bus Fittings
Burndy Eng'g Co.
General Elec. Co.

Cables Accessories
General Cable Corp.
General Elec. Co.
John A. Roebling's Sons Co.

Cables
American Steel & Wire Co.
Columbia Steel Co.
Crucible Steel Co. of America
General Cable Corp.
General Elec. Co.
Graybar Elec. Co., Inc.
Maydwell & Hartzell, Inc.
Providence Insulated Wire Co.
John A. Roeb'ing's Sons Co.
Westinghouse Elec. & Mfg. Co.

Carbon Brushes
National Carbon Co., Inc.

Carbon Products
National Carbon Co., Inc.

Central Station Equipment
Tom Wood

Chimes
Square D Co., Inc.

Circuit Breakers
General Elec. Co.
Westinghouse Elec. & Mfg. Co.

Cleaners, Vacuum
Apex Rotarex Mfg. Co.
Clements Mfg. Co.
Cramer Elec. Co.

CRAMER'S
REBUILT CLEANERS
Parts for all makes
Write for Catalog
CRAMER ELEC. CO.
1301 W. Washington
Los Angeles, Cal.

Coil Winding
Jeffries Transformer Co.

Compounds, Insulating
John C. Do'ph Co.
General Cable Corp.
General Elec. Co.

Condensers, Electric
Allis-Chalmers Mfg. Co.
J. G. Corrin
General Elec. Co.
Westinghouse Elec. & Mfg. Co.

Conduit
General Elec. Co.
Steel & Tubes, Inc.
Youngstown Sheet & Tube Co.

Conduit, Underground
Fire Proof Wall Co.
Johns-Manville Corp.

Connectors
Burndy Eng'g Co.
James R. Kearney Corp.

Cutouts
James R. Kearney Corp.
General E'ec. Co.
Westinghouse Elec. & Mfg. Co.

Demand Control
General Elec. Co.
Wesix, Inc.

Distribution Specialties
General E'ec. Co.
James R. Kearney Corp.
W. N. Matthews Corp.
Maydwell & Hartzell, Inc.
St. Louis Malleable Casting Co.
Waltham, DeWitt & Krusi

Electrodes, Arc Welding
John A. Roebling's Sons Co.
General Elec. Co.

Fans
General Elec. Co.

Farm Electrification Equipment
General Elec. Co.

Fittings, Conduit
General Elec. Co.
Steel & Tubes, Inc.

Fixtures, Lighting
General Elec. Co.
Russell & Stoll Co.
Smoot-Holman Co.

Floodlighting
General Elec. Co.
S & M Lamp Co., Inc.
Smoot-Holman Co.

Fuses
Trico Fuse Mfg. Co.

Gasoline
Union Oil Co.

Generators
Allis-Chalmers Mfg. Co.
General Elec. Co.
Westinghouse Elec. & Mfg. Co.

Graphite Products
National Carbon Co., Inc.

Ground Rods
Crucible Steel Co.
Maydwell & Hartzell, Inc.

Heaters, Air
Edison Gen. Elec. Appliance Co.
Montgomery Bros.
Noblitt-Sparks Industries, Inc.
Sandoval Sales Co.
Thermador Elec'l Mfg. Co.
Wesix Inc.
Edw. L. Wiegand Co.

Heaters, Water
Edison Gen. E'ec. Appliance Co.
Lindemann & Hoverson Co., A. J.
Malleable Iron Range Co.
Sandoval Sales Co.
Thermador Elec'l Mfg. Co.
Wesix Inc.
Westinghouse Elec. & Mfg. Co.

Heating Element—Repair Part
Mend-It Sleeve Mfg. Co.
Edw. L. Wiegand Co.

THERMADOR
Air Heaters and
Thermador - Everhot Water Heaters
"Seven Leagues Ahead"
THERMADOR ELECTRICAL MFG. CO.
116 LLEWELLYN STREET LOS ANGELES, CALIF.

WHY this G-E Time Switch is the Most Economical for Water-heater Control

It has the lowest original cost . . . the lowest installation cost . . . and the lowest maintenance expense

Let us tell you more about G-E time switches for "off-peak" water-heater control. Address the nearest G-E sales office, the G-E Supply Corporation, or the Graybar Electric Company, Incorporated; or simply mail the attached coupon.

GENERAL ELECTRIC

GENERAL ELECTRIC COMPANY
Dept. 6L-201, Schenectady, N. Y.

Please send me your bulletin GEA-1669B, "Time Switch for Controlled Water Heating."

Name.....

Firm.....

Street.....

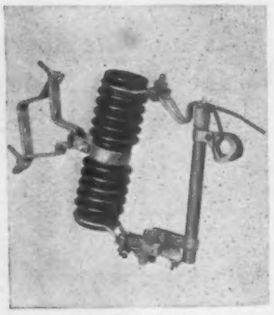
City..... *State*..... 440-46

IT WILL PAY YOU TO *Look into G-E Cutouts*

ENCLOSED

◀ G-E enclosed, expulsion-type fuse cutouts have great mechanical and dielectric strength. They provide maximum safety for the lineman. Used with G-E low-temperature fuse links they give full-range, short-circuit protection for distribution transformers.

G-E open fuse cutouts with drop-out fuse holders will ▶ save you time and money in detecting blown fuses and in restoring service. Their simplified design makes fuse renewal easy and reduces the costs of maintenance to the minimum.



OPEN DROP-OUT

INDICATING AND DROP-OUT

◀ G-E 2-in-1, enclosed indicating and drop-out fuse cutouts give you your choice of two methods of indication—by partial opening of the door, as shown here, or complete drop-out. Safety, ease of fuse renewal, and positive operation are other features of this cutout.

G-E oil fuse cutouts will ▶ protect your service and equipment. They will operate effectively under water, in inflammable gases, and under other adverse conditions. They can save you money by confining service interruptions to the point where the fault occurs.

OIL FUSE (SUBWAY)

G-E cutouts have high mechanical and electrical strength. Their liberal factors of safety have been effectively demonstrated by short-circuit tests, flashover and puncture tests, A.I.E.E. thermal and dielectric tests, as well as by service records and other tests.

The standards set as a result of these tests are maintained by constant laboratory supervision of materials and continued testing of parts and complete cutouts.

Ask your G-E representative for further information. General Electric, Dept. 6A-201, Schenectady, N. Y.

340-13

GENERAL ELECTRIC

Where to Buy It in the West—Continued

Illuminating Glassware
Inland Glass Works, Inc.

Instruments, Measuring
General Elec. Co.
Quality Elec. Co.
Roller-Smith Co.
Westinghouse Elec. & Mfg. Co.
Weston Elec'l. Instrument Corp.

Insulation
General Elec. Co.
Johns-Manville Corp.
C. D. LaMoree

Insulators
Corning Glass Works
Graybar Elec. Co., Inc.
Hemingray Glass Co.
Illinois Elec. Porcelain Co.
Lapp Insulator Co., Inc.
Locke Insulator Corp.
McLaughlin Glass Co.
Owens-Illinois Glass Co.
Westinghouse Elec. & Mfg. Co.

Ironers
Apex Rotarex Mfg. Co.
Easy Washing Machine Corp.
General Elec. Co.
Ironite Ironer Co.
Mary Dowd Reardon Studios
Savage Distributing Co.
Gordon E. Wilkins

Lamps, Mazda
General Elec. Co.
Westinghouse Lamp Co.

Lamps, Sun
General Elec. Co.

Lighting Equipment
Smoot-Holman Co.
Wuelker Reflector Lighting Corp.

Line Material
Maydwell & Hartzell, Inc.

Meters
General Elec. Co.
L. A. Nott
Sangamo Elec. Co.
Westinghouse Elec. & Mfg. Co.
Weston Elec'l Instrument Corp.

Molded Material
Electrical Specialty Co. of So. Calif.
C. D. La Moree

Motors
Allis-Chalmers Mfg. Co.
General Elec. Co.
Westinghouse Elec. & Mfg. Co.

Motor Starters
Allis-Chalmers Mfg. Co.
General Elec. Co.
Ward Leonard Elec. Co.
Westinghouse Elec. & Mfg. Co.

Oil, Lubricating
Union Oil Co.

Oil, Transformer & Switch
General Elec. Co.
Union Oil Co.

Panel Boards
General Elec. Co.
Westinghouse Elec. & Mfg. Co.

Photoelectric Cells
General Elec. Co.
Weston Elec'l Instrument Corp.

Pins, Wood
Locust Pin Co.

Pole Line Hardware
General Electric Supply Corp.
Graybar Electric Co., Inc.
Hubbard & Company
Joslyn Co. of Calif.
Kortick Mfg. Co.
Locke Insulator Corp.
Maydwell & Hartzell, Inc.

Public Address Systems
Electro-Acoustics Products Co.
Waltham, DeWitt & Krusi

Public Utilities
Pacific Gas and Elec. Co.
San Joaquin Light & Power Corp.
Southern Calif. Edison Co. Ltd.

Pumps
Pelton Water Wheel Co.

Range Units
Edison Gen. Elec. Appliance Co.
L. W. Thompson
Edwin L. Wiegand Co.

Ranges
Edison Gen. Elec. Appliance Co.
General Elec. Co.
General Elec. Supply Corp.
Lindemann & Hoverson Co., A. J.
Malleable Iron Range Co.
Standard Elec. Stove Co.
Walker & Pratt Mfg. Co.

Refrigerator Parts & Accessories
California Refrigerator Co.

Refrigerators
Frigidaire Corp.
General Elec. Co.
General Elec. Supply Corp.
Graybar Elec. Co., Inc.
Malleable Iron Range Co.
Westinghouse Elec. & Mfg. Co.

Relays
General Elec. Co.
Leach Relay Co.
Ward Leonard Elec. Co.

Rheostats & Resistors
General Elec. Co.
Ward Leonard Elec. Co.
Westinghouse Elec. & Mfg. Co.

Service Organizations
Elec. Refrigeration Bureau
Elec'l Testing Labs.
McGraw-Hill Book Co.
Northwest Elec. Light & Power Association
Pacific Coast Elec'l Ass'n
Pacific Coast Elec'l Bureau

Signs, High Voltage
W. D. Howze Sales Co.

Strand, Guy
Crucible Steel Co.
Maydwell & Hartzell, Inc.
Pacific Wire Rope Co.

Switchboards
Allis-Chalmers Mfg. Co.
General Elec. Co.
Square D Co., Inc.

Switches, Coin Operated
Welcome Meter Co.

Switches, High Tension
Bowie Switch Co.
James R. Kearney Corp.
General Elec. Co.
C. D. LaMoree
Pacific Elec. Mfg. Co.

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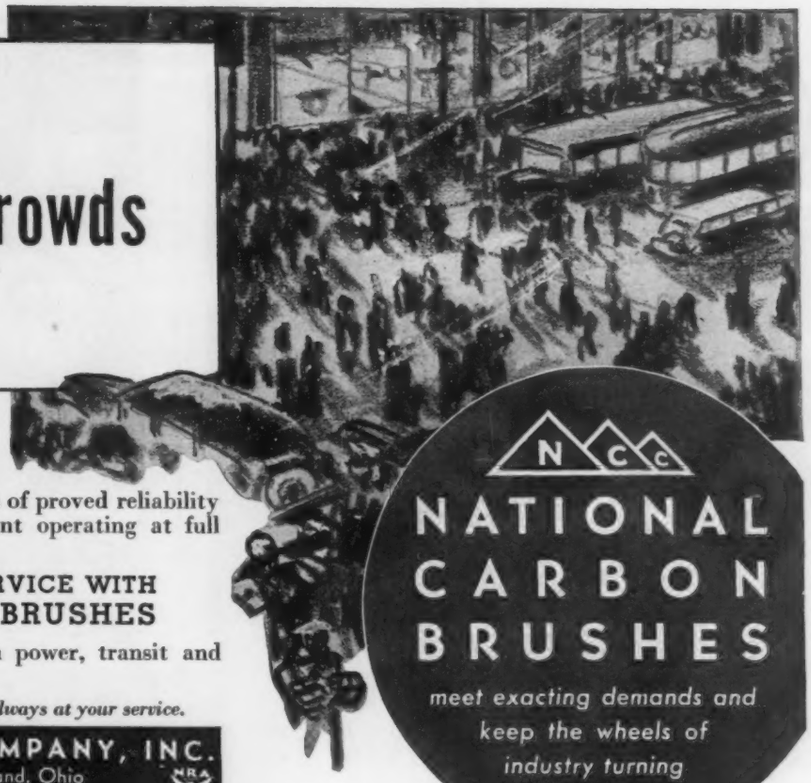

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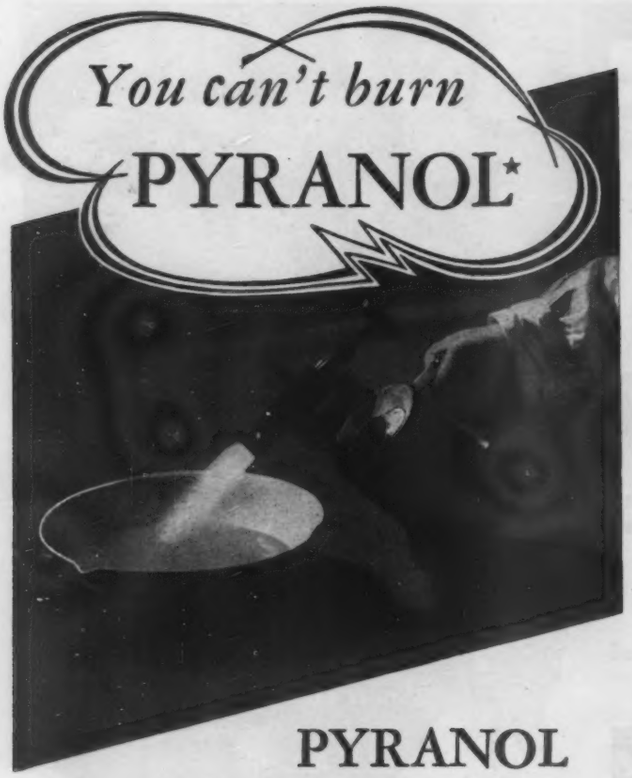

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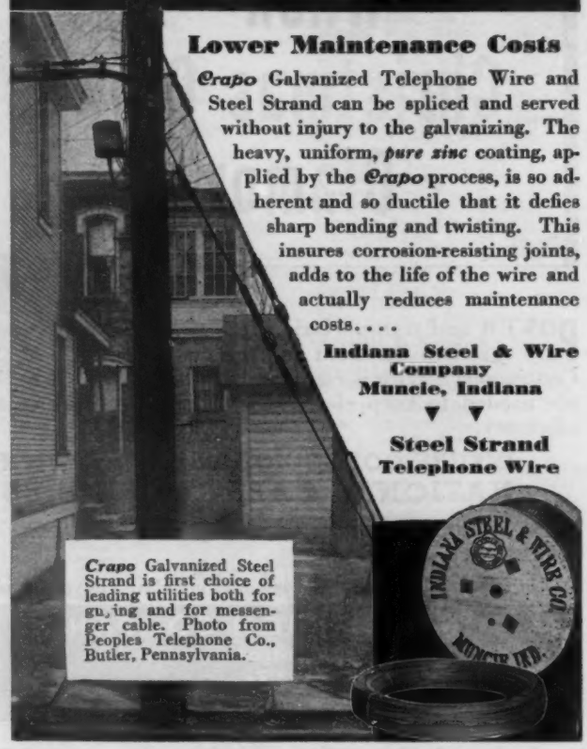

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Steel Strand
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The National Whirligig

WASHINGTON
By GEORGE DUNNO

CREDULITY The master minds are in a huddle figuring out how best to nip the movement for immediate half-payment of the bonus before it gets too much momentum. One group has a plan they believe to be a natural. They intend to urge it as against the first congressional idea of offering to cancel all interest on the 10 per cent bonus "loans" already acquired by the veterans, which interest would run up most of the balance due by 1945.

Briefly, the plan involves immediate bonus payment—on a basis of its 1945 value—only to veterans with dependents, who are proven to be in dire need. Federal Relief Administrator Hopkins would certify, to Veterans' Administrator Hines the names of such men. Political considerations would be removed by providing criminal penalties for relief officials making false certifications or veterans making false claims of need.

The average bonus remaining unpaid to the vets presents a total of $500, this could be paid in three annual payments over five or six years after which would carry home into the Treasury. Federal relief rolls would benefit by not having to support them during that period and they would have to expect time in which to build jobs suitable former or to the supplies of contribute as soldiers of the World War are looking. If the entire personnel rolls of those of other up to-date relief organizations were cleared of the 4,000,000 veterans and dependents now receiving relief, the saving would be [illegible]

Good News

VOL. CXXI— C 11

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